Another Goodyear First:

V-Belts *with the* Green Seal

stay matched from factory to drive

The Green Seal signifies true dimensional stability. It means that now when you reach for a matched set of V-belts, you can be sure they're matched – no matter how long they've lain on the shelf. And that means longer life and a minimum of down time.

It used to be that only steel-cable V-belts by Goodyear were length stabilized. But now, through the miracle of Triple-Tempering, they've been joined by all the other Goodyear Industrial V-belts.

Triple-Tempering is the exclusive process wherein synthetic cord is carefully brought to the peak of strength and stability by controlled tempering with Tension, Temperature and Time. And this gives you not only *length* stability in storage, but greater shock- and stretch-resistance on the drive.

In addition to 3-T load-carrying members, the Green Seal also brings you "balanced construction." This means each component of the belt is specifically designed to its job to give you cleaner, smoother, longer running which adds up to maximum, trouble-free horsepower hours at minimum cost.

The next time you need V-belts, be sure they're wearing the Green Seal–the mark of a V-belt made with the technical know-how of the world's largest rubber company. They're readily available at your Goodyear Distributor. Or write for details to Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

DIMENSIONALLY STABLE V-BELTS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Green Seal—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Instrument Course at L & N

ENGINEERS AND technicians interested in learning the operation, maintenance and trouble shooting of L & N instruments and controls they are now using can take advantage of the two-week courses conducted at Leeds & Northrup's Customer Training Center in Philadelphia.

For his industry selection, the student may choose metal working, metal refining and ceramics; or the chemical process industries; or the steam and electric power industries.

In each course, the first week is devoted to measurements; the second week to controls. A student may register for either or both weeks, depending upon his requirements. In either case, he works in a combined shop and classroom, receiving thorough instruction in installation, operation and maintenance procedures.

Emphasis is placed on trouble shooting, and on instrument adjustments that provide top operating performance. Slides, motion pictures and exploded circuit demonstrators are used, and a variety of the company's products are available for students to "learn by doing."

There is no charge for tuition, texts, manuals, etc.; however, the student or employer will have to pay travel, hotel and other expenses.

Additional information about this Customer Training Center is incorporated in a folder which may be obtained by writing to Leeds & Northrup Co., Philadelphia 30, Pa.

Hugh Olson Joins Rhinelander

Hugh Olson recently joined the staff of the Rhinelander Paper Co. Converting Plant as converting plant engineer. In this capacity, his responsibilities will cover preventive maintenance, project engineering and general duties as carried out at the converting plant.

Previous to joining the company, Olson was employed as an assistant to the factory manager at Johnson Motors, Waukegan, Illinois.

Sessions on Power Rectifiers

SIXTEEN PAPERS will be presented at the two-day conference on power rectifiers. It will be held at the Morrison Hotel, Chicago, on June 4th and 5th.

Papers will cover such subjects as: general theory and basic principles, fields of applications of various types of rectifiers, progress in standardization, application practices and operation and maintenance. These papers will be principally concerned with mercury arc, metallic and semi-conductor rectifiers for power service where installations ratings range from a few 100 amps to over 100,000 amps.

Highlight of the conference will be a panel discussion on application and maintenance. The symposium will begin with a short presentation on experience in each of the following fields: Low voltage electro-chemical, low voltage plating, high voltage electro-chemical and steel mill auxiliaries and main drives.

More information about this conference may be obtained by writing to R. S. Gardner, Assistant Secretary, Technical Activities, American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y.

Babcock & Wilcox Appointment

Michael Parahus, Jr., has been appointed to the position of assistant chief electrical engineer of The Babcock & Wilcox Co., Tubular Products Division, Beaver Falls, Pennsylvania.

He will be directly responsible to the chief electrical engineer and will be concerned with engineering problems in the Beaver Falls, Pa., Alliance, O., and Milwaukee, Wis., plants of the Division.

Mr. Parahus joined the company in 1952 after receiving his B.S. degree in electrical engineering from the University of Toledo. He has participated in planning a revamped electrical supply system at the Milwaukee plant and has been active, also, in detailed planning of the relocation of similar equipment at the Alliance plant.

What's Ahead for Industry?

GENERAL ELECTRIC Co. and the Public Service Electric & Gas Co. were cosponsors of the 100th Industrial Productivity Forum held in Newark, New Jersey, early this year. E. B. Skubik, of the editorial staff of PLANT ENGINEERING, was among some 550 conferees who attended this Forum at the Hotel Essex House.

Some of the subjects given attention during the meeting were: industrial tele-

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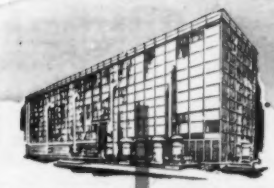
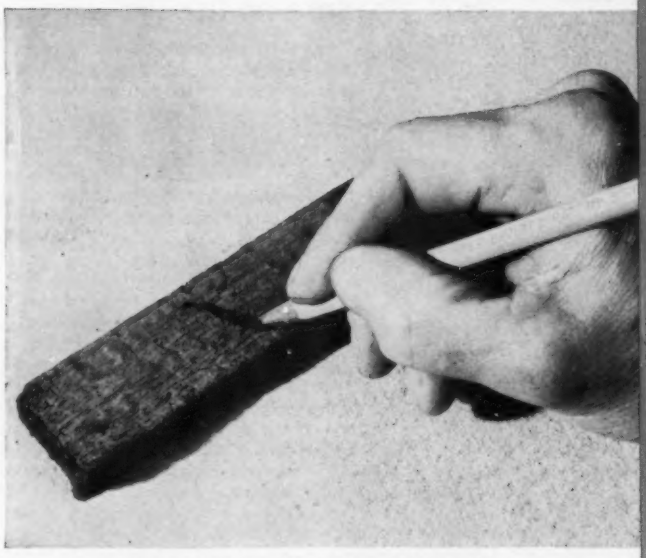
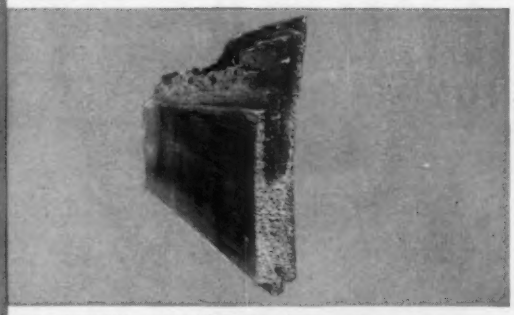
Why Cooling Towers Fall Apart



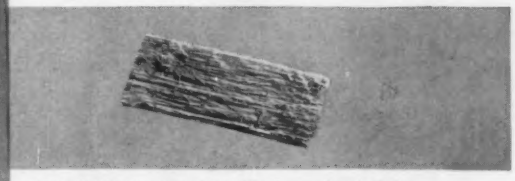
. . . and how to prevent it!



SURFACE DETERIORATION of cooling tower lumber sample has softened wood so that an ordinary pencil gouges it deeply.



INTERNAL ATTACK by fungus gives no warning of impending collapse. Outer wood surface looks perfectly sound.



CHEMICAL LEACHING from chemicals in water weakens wood, dissolves wood components that resist attack by fungi and bacteria.

Cooling towers often almost literally commit suicide because efficient cooling sets up ideal conditions for deterioration of the best woods used in their construction.

WHAT HAPPENS? Warmth and moisture present in cooling towers are perfect for microbiological growth . . . specifically, the bacteria and fungi which destroy wood. Cooling tower lumber is naturally resistant to these organisms — until the flow of water, containing chemicals either naturally present or added for slime, algae, scale or corrosion control, leaches out the materials which provide this resistance.

Some microbiological growths destroy the cellulose which gives wood its structural strength. Others remove the lignin that is a binder of wood's components. Either way, or both, mean expensive trouble . . . worse if the attacking fungi cause internal decay which can easily go undetected until too late to take protective measures.

PREVENTIVE PROGRAMS

Since cooling towers function with piping and other equipment which must be protected from slime, scale and corrosion, it is evident that measures taken to prevent wood rot and leaching should not interfere with other system treatments — and vice versa.

This is Nalco's cue to enter the picture. The Nalco System takes *all* phases of protection into consideration . . . applies treatments that are compatible with each other . . . and with the cost accounts. A phone call or letter will bring the best efforts of the world's largest water treatment organization to bear on your problems.

★ ★ ★

A magazine article "Why Cooling Towers Decay," goes into detail on the subject. Is available as Nalco Reprint No. 58. Your copy free on request.

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WATER TREATMENT . . . PAPER MILL PROCESS CHEMICALS . . . REFINERY CORROSION CONTROL . . . ION EXCHANGE . . . WEED & BRUSH CONTROL . . . SLIME & ALGAE CONTROL . . . PROCESS ANTIFOAMS & COAGULANTS . . . PETROLEUM CATALYSTS . . . COMBUSTION CATALYSTS . . . FUEL OIL STABILIZATION . . . CHEMICAL INTERMEDIATES . . . CONSULTING SERVICES

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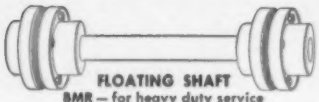
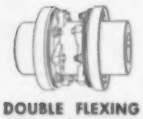
Specify
THOMAS
FLEXIBLE COUPLINGS

DOUBLE FLEXING
DBZ — for high speed, heavy duty drives



FLOATING SHAFT
BMR — for heavy duty service with excessive misalignment



DOUBLE FLEXING
AMR — for engine and medium speed drives

SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog 51-A

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WARREN, PENNSYLVANIA, U. S. A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

vision, materials handling, electronic and tape control and air conditioning.

According to one of the speakers, E. H. Norling of the Air Conditioning Division of G. E., a high percentage of modern production facilities in the United States will be air conditioned in the near future compared to the small percentage now air conditioned.

Another speaker, Frank P. Barnes of the Industrial Television Department, stated that closed-circuit TV will be an every day tool of American industry well before 1976.

Mention was also made of a new development —"slow scan" television. In the slow scan system, which is adaptable to industrial uses, fewer images per a given time interval are transmitted than by the technique in use today. A telephone voice line can be used to transmit slow scan pictures.

Guide for Selecting An Air Compressor

To enable you to select the right air compressor for the job, members of the Air Compressor Research Council have prepared a booklet on the important things to consider.

The booklet "How to Select an Air Compressor of the Right Size and Type" discusses air compressor ratings, displacement and "free air," volumetric efficiency, types of air compressors and types of operation.

Numerous charts are included to enable you to determine the cubic feet per minute required to operate various pneumatic equipment, cylinder diameters required to develop power to overcome indicated loads, volume of compressed air in cubic feet required per stroke to operate air cylinders and flow of free air through orifices of various diameters. Use of the charts is explained with examples. Also included in the booklet are installation recommendations, maintenance instructions and an explanation of compressed air terminology.

Copies of this booklet may be obtained for 50 cents each by writing directly to the Air Compressor Research Council, 27 East Monroe St., Chicago 3, Illinois.

P.E. Changes at General Motors

C. H. Collins has been named plant engineer of the Pontiac Motor Division. He succeeds **T. W. Bradford** who will report directly to B. E. Starr, general manufacturing manager, on special assignment.

Collins joined General Motors' Central Foundry Division in 1950 where he served in various capacities including plant engineer of the Division's Defiance plant before joining Pontiac in August 1955, as foundry plant engineer. He has a degree in electrical engineering from the University of Minnesota.

Bradford joined General Motors in 1919. His career with Pontiac began in 1926 and he has been a plant engineer in the Pontiac division since December, 1931.

Motion and Time Study Course

Emphasis on setting up correct methods of motion and time study before work is in existence as well as techniques for the improvement of existing methods and procedures will be discussed at the annual Motion and Time Study Intensive Course. The course will be offered by the Department of Industrial Engineering and University College of Washington University in St. Louis from June 5th through June 14th.

Objectives of the course will be to help prepare the attendee to (1) apply motion and time study in his own organization and (2) train others in his company in the principles of motion and time study.

Several visiting speakers will present their experiences on the application of motion and time study to further enhance the material of the course.

For further information concerning course content, instructors and registration, write to University College, Washington University, St. Louis 5, Missouri.

Master Mechanic Lauer

Albert Lauer has been appointed master mechanic for Electro Mechanical Products Co., Garden City, Michigan.

He was formerly the firm's tool room supervisor for three years. Prior to joining the company, he was engaged in the tool and die business in Detroit as a factory manager and general manager.

From Plant Engineer To Plant Manager

Earl A. Neeb, formerly general superintendent of hot rolling and slab conditioning department, Brackenridge Works, Allegheny Ludlum Steel Corp., has been appointed plant manager of the Toronto, Ohio, plant of the Titanium Metals Corp. of America, which was recently purchased by Allegheny Ludlum.

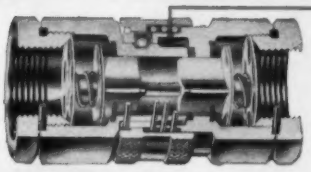
Mr. Neeb, a Lafayette College graduate in mechanical engineering, first worked for Bethlehem Steel Corp., as superintendent of the Franklin plant, and joined Allegheny Ludlum in 1949 as plant engineer of the Brackenridge Works. He progressively moved through superintendent and manager of the blooming and hot-strip departments to general superintendent of the hot rolling and slab conditioning department.

WHICH SNAP-TITE QUICK-CONNECT COUPLING IS BEST FOR YOU?

SNAP-TITE "H" COUPLING . . . . . FOR HIGH PRESSURE APPLICATIONS

FOR HYDRAULIC OR AIR

"H" Coupling for high strength, higher efficiency, high-resistance to heavy line surge. Sizes: ⅛" thru 12". Bulletin No. 240

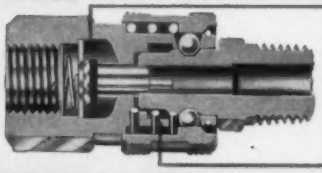


Exclusive U-packer gives a positive seal without compression set because of rubber distortion. Line pressure inside the U-packer keeps it open and forced against its metal backing—the higher the pressure, the tighter the seal.

SNAP-TITE HI-FLOW COUPLING . . . FOR LOW PRESSURE APPLICATIONS

FOR AIR AND FLUIDS UP TO 150 p.s.i.

Hi-Flow is recommended to connect small air tools to plant air system, and for low pressure fluid transfer in small lines. Sizes: ⅛" thru ¾". Bulletin No. 230

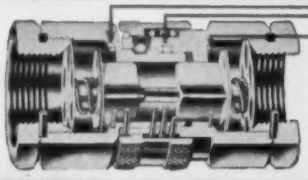


Bonded valve washer
(pat. pending on valve construction)

Exclusive U-packer

SNAP-TITE "HK" COUPLING . . . . . FOR HARD TO HANDLE FLUIDS

FOR FUMING ACIDS, ALKALIES, SOLVENTS, AND HIGH PRESSURE STEAM . . . "HK" is the only coupling now on the market for fluid temperatures from —100° F to +500° F . . . and for live steam up to 460° F. Its seals are made of Teflon for which there is no known solvent. Sizes: ½" thru 3". Bulletin No. 270



Teflon Valve Seal

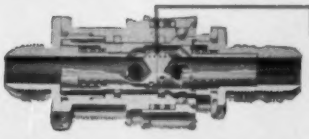
Teflon Nipple Seal

Teflon Valve Seal

SNAP-TITE NO-SPILL COUPLING . . . FOR MINIMUM AIR INCLUSION

FOR AIRCRAFT, MISSILE HYDRAULIC, FUEL SYSTEMS

which cannot stand air in the lines, and for transmitting fluids which *must not spill*, the Snap-Tite no-spill coupling is recommended. Bulletin No. 280

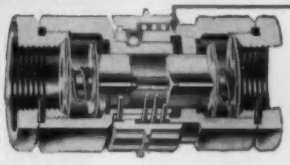


Flush valves prevent spillage, air inclusion. Snap-Tite will engineer special variations to your requirements.

SNAP-TITE "E" COUPLING . . . . . FOR VACUUM and VERY LOW PRESSURE

FOR VACUUM SYSTEMS IN THE MICRON RANGE

"E" Coupling performs in the *micron* range in the smaller sizes both connected and disconnected. Recommended, too, for gravity flow . . . U.L. approved for LP Gas. Sizes: ⅛" thru 12". Bulletin No. 250



Nipple seals in coupler by depressing the lip of the E packer and slightly compressing the body of the packer. This new E-packer gives positive seal under high-pressure, low-pressure, and vacuum.

Snap-Tite Couplings are available plain, (without valves), and with either single or double shut-off. Couplings normally furnished in alloy steel, but all (except hi-flow) are also available in brass, aluminum, or stainless steel with a variety of finishes.

Snap-tite

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

SNAP-TITE, INC., UNION CITY 5, PA.

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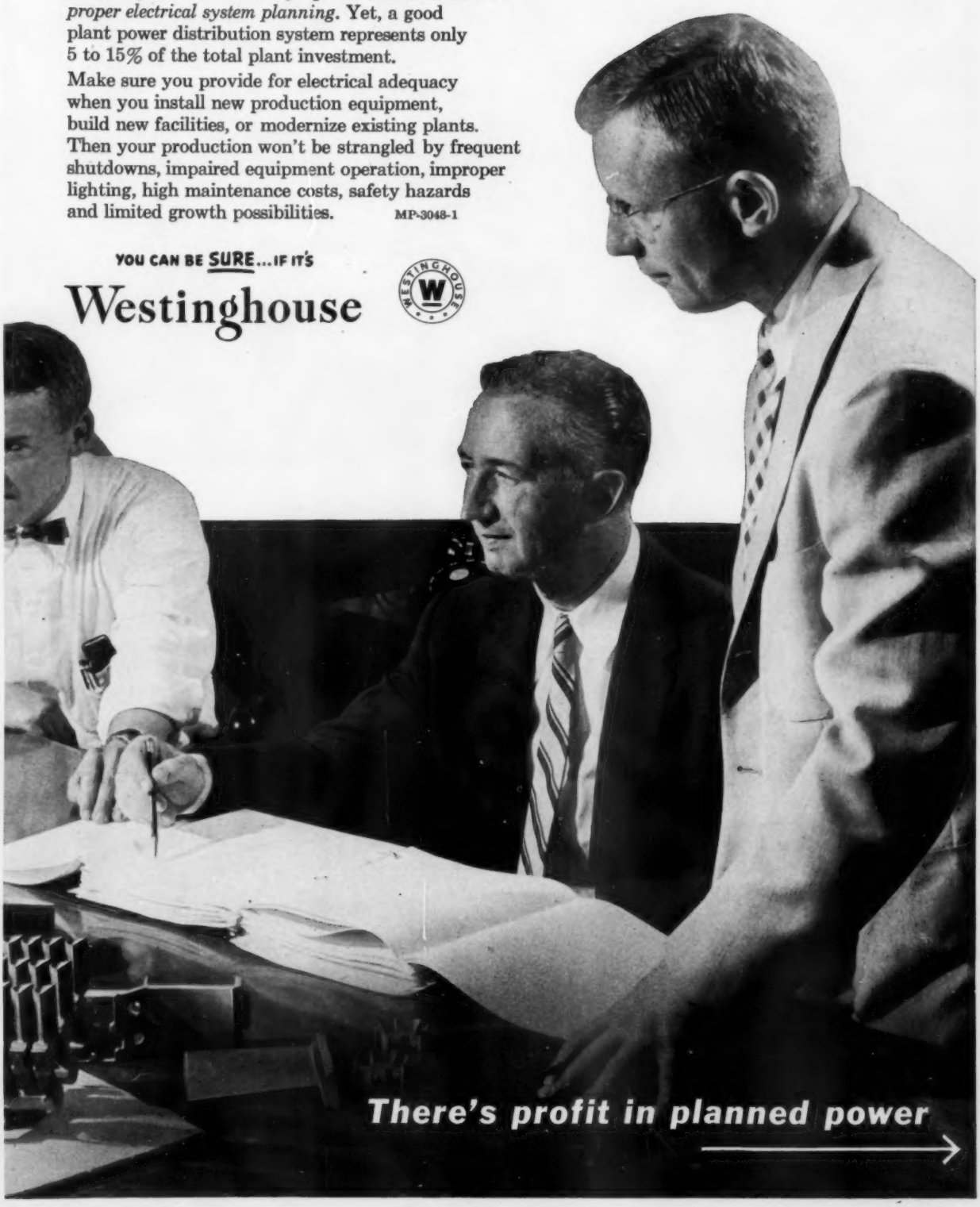
Make sure your production isn't strangled by inadequate power!

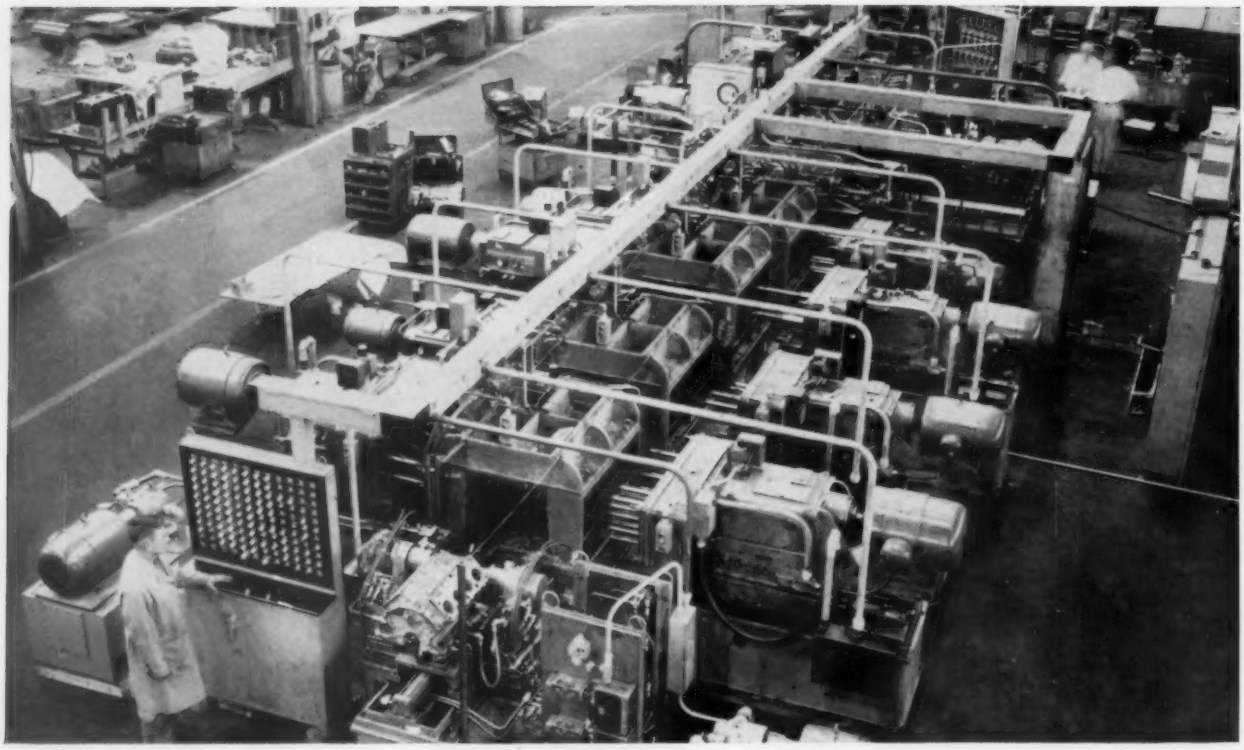
Production, marketing and financial plans are the traditional tools by which alert plant management stays competitive. Today, however, success of all three depends considerably upon a fourth factor . . . *proper electrical system planning*. Yet, a good plant power distribution system represents only 5 to 15% of the total plant investment.

Make sure you provide for electrical adequacy when you install new production equipment, build new facilities, or modernize existing plants. Then your production won't be strangled by frequent shutdowns, impaired equipment operation, improper lighting, high maintenance costs, safety hazards and limited growth possibilities. MP-3048-1

YOU CAN BE **SURE**...IF IT'S

Westinghouse





POWER-UP **with Westinghouse:**

make your production system more dependable, economical . . . keep it flexible, expansible

When you POWER-UP with Westinghouse, production gains in scope. Continuous power supply, coupled with constant voltage, brings new reliability to production. Provision for load growth and built-in flexibility means you're prepared electrically for years to come. Years, incidentally, that will see use of electricity in-increase about 8% per year. A modern distribution system also brings new advantages in convenient arrangements and easy maintenance.

Let Westinghouse help you get adequate plant power with economy and safety through proper system design and voltage, increased transformer and circuit capacities, higher interrupting capacity. There's profit in planned power—particularly if it's Westinghouse.

Characteristics of Distribution Systems

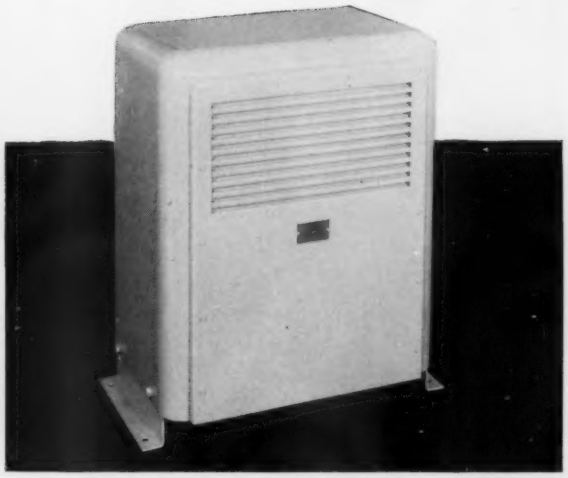
TYPE OF SYSTEM	Flexibility	Service Continuity	Regulation	Efficiency	Operation and Maintenance Cost	Initial Investment
Modern Simple Radial	F	F	D	C	A	A
Primary-Selective Radial	D	D	D	B	A	B
Simple Network	A	A	A	C	B	E
Simple Spot Network	C	A	A	D	D	E
Primary-Selective Network	A	A	B	A	C	D

LEGEND: A . . . 91-100% B . . . 81-90% C . . . 71-80% D . . . 61-70% E . . . 51-60% F . . . 41-50%

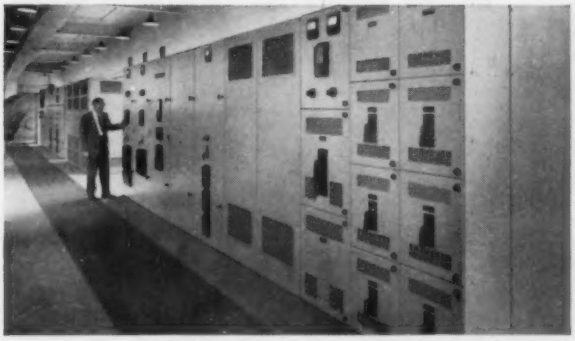
Approximate relative standing of five basic distribution systems. For detailed analysis of your system, consult your Westinghouse salesman. MP-3048-2

YOU CAN BE SURE... IF IT'S Westinghouse

Westinghouse dry-type power centers eliminate fire hazard. Location close to load shortens secondaries, cuts line losses, improves regulation. They're 25-40% lighter than liquid filled . . . easily mounted overhead to save production space.

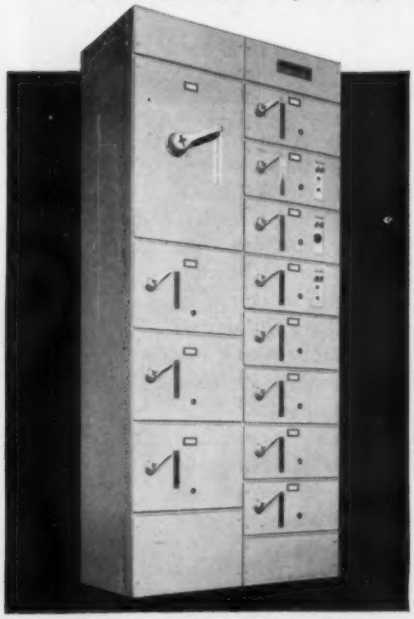


New Westinghouse 3-phase dry-type transformers fit easily into convenient, close-to-load points. Smaller (25-51%), lighter (17-32%), quieter (12-13 db below NEMA standard). Low case temperatures. Save 36% in installation costs.



Westinghouse low-voltage, metal-enclosed switchgear has high interrupting capacity for dependable operating continuity and safety. Unitized design reduces costs, provides custom installation for your needs.

Westinghouse capacitors, used with inductive equipment, permit more of your system's capacity to carry working current. You get improved power factor, lower costs, more capacity for new loads.



New design Westinghouse control centers simplify layout, installation, service, future growth. They make possible a compact, centralized control system . . . assuring coordinated motor control and greater savings.

Coordinated design of Westinghouse AB De-ion® circuit breaker-type panelboards (right) assures positive protection to lighting and heavy power circuits. An accurate thermal-magnetic action allows full time delay on overloads, but trips instantly on short circuits.

For more facts circle 506 on Reply Card

A Beautiful

NEW! MICRO-MOUNT

Fast and accurate mounting is made possible by the new Dodge Micro-Mount. The Adapter is snugged up with the Micro-Mount Nut. Mounting is completed by turning the Micro-Mount Screws against the Lockwasher until bearing, adapter and shaft form an integral unit.

Now — a spherical roller bearing pillow block has been added to "America's most complete line of mounted bearings."

This new Dodge product possesses all the fine characteristics of the spherical type, plus the precision, dependability and refinements you would expect from the nation's leading supplier of mounted bearings.

Rugged housing of close-grained semisteel, in compact modern design, withstands shock loads. The new Micro-Mount Adapter seats Spher-Align solidly on shaft, *with amazing ease and speed.* A new feature of bearing design allows lubricant to enter at center of bearing and move outwardly along all bearing surfaces. Convenient drain plugs permit use of either grease or oil and provide for easy flushing. Triple seals retain lubricant.

Standardized dimensions make Spher-Align interchangeable with all other similar units. Available in expansion and non-expansion types. In stock for 2 7/16" to 8" shafts. Call your Dodge Transmissioneer — or write us.

DODGE MANUFACTURING CORPORATION • 2700 UNION ST., MISHAWAKA, INDIANA

New Bearing by Dodge —

Spher-Align

ANNOUNCING AMERICA'S NEWEST SPHERICAL ROLLER BEARING PILLOW BLOCK ...A RUGGED BEARING IN ATTRACTIVE MODERN DESIGN...INHERENTLY SELF-ALIGNING...EASY TO INSTALL...EASY TO MAINTAIN...AND FEATURING THE UNIQUE MICRO-MOUNT ADAPTER

AMERICA'S MOST COMPLETE LINE OF MOUNTED BEARINGS

DODGE-TIMKEN
Tapered Roller

SPHER-ALIGN
Spherical Roller

SC, SCM, SL
Ball

SLEEVOIL
Precision Ring Oiling

BRONZOIL
Capillary Oiling

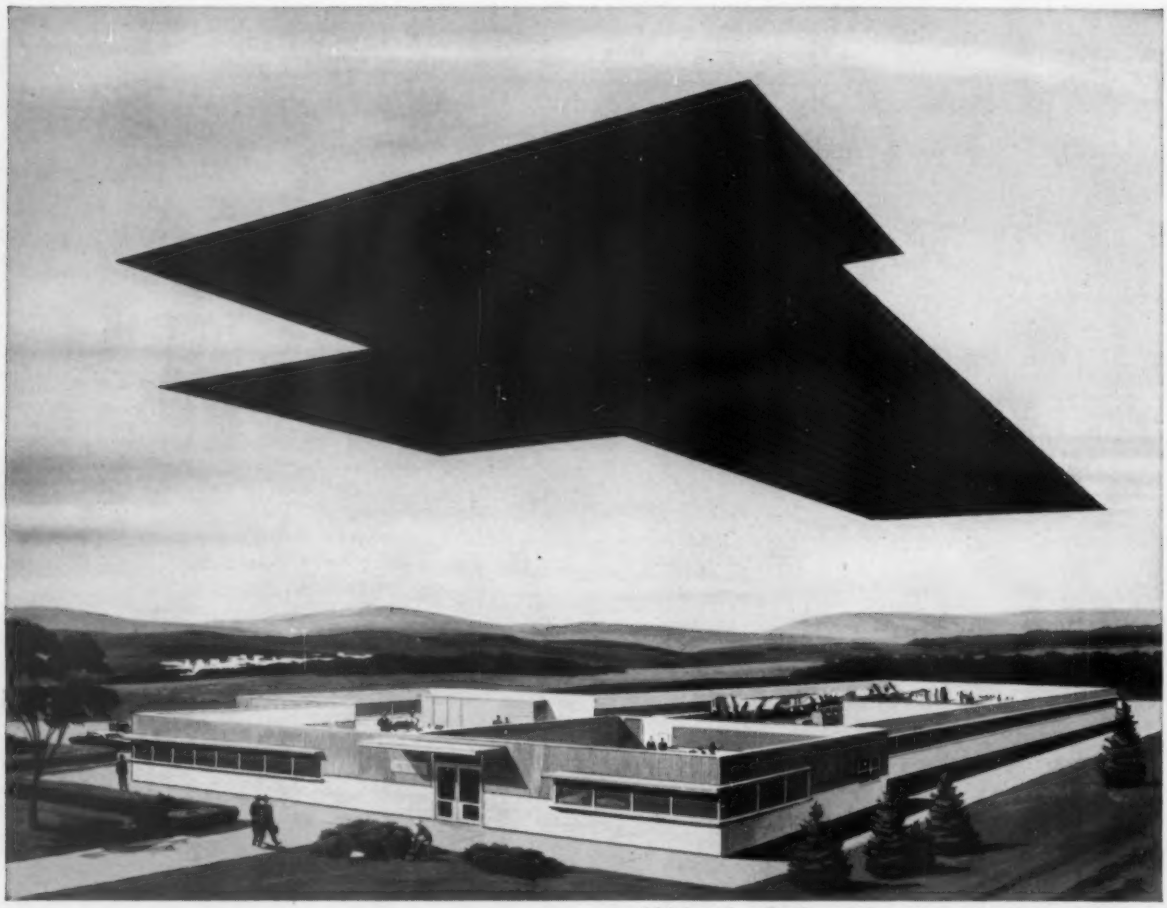
BABBITTED
Solid and Split

PILLOW BLOCKS • HANGER BEARINGS
FLANGE BEARINGS • UNIT MOUNTS • TAKE-UPS

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in the yellow pages of your telephone directory — or write us.

For more facts circle 507 on Reply Card



J-M Aquadam Roofs provide lasting roof protection. They are specifically designed for low pitch and dead level roof decks.

Don't wish a good roof over your building...

install a Johns-Manville Aquadam Built-Up Roof and be sure

A GOOD ROOF is in reality a valuable "over head" investment. The roof is subject to the hardest wear of any part of a building. Johns-Manville Aquadam Roofs provide long-lasting protection with a minimum of roofing repair and maintenance expense.

J-M Aquadam Roofs owe their superiority to Aquadam, the modern cementing agent used in the application of felts. Aquadam has exceptionally high adhesive and permanent bonding properties. It has approximately twice the ability of typical asphalts to retain its initial properties on exposure.

Aquadam Built-Up Roofs resist beating rains, winds, melting snow and ice. The result is thorough watertightness in low sloped and dead level roofs.

The high ductility of J-M Aquadam helps prevent roof cracking. Aquadam reseals and repairs itself after being subjected to the equivalent of summer roof temperatures.

Aquadam Built-Up Roofs are available in both smooth surfaced and slag or gravel specifications.

If planning a new roof installation or replacing an old one, you'll assure your building of reliable protection, by specifying a J-M Aquadam Built-Up Roof. Your Approved Johns-Manville Contractor is listed in the Classified Section of the telephone directory. For complete details, write: Johns-Manville, Box 158, New York 16, New York. In Canada, write 565 Lakeshore Road East, Port Credit, Ontario.

THE AMERICAN INSTITUTE OF ARCHITECTS 1857-1957

Johns-Manville congratulates the American Institute of Architects on its 100th Anniversary.

—Consult an architect—use quality materials.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

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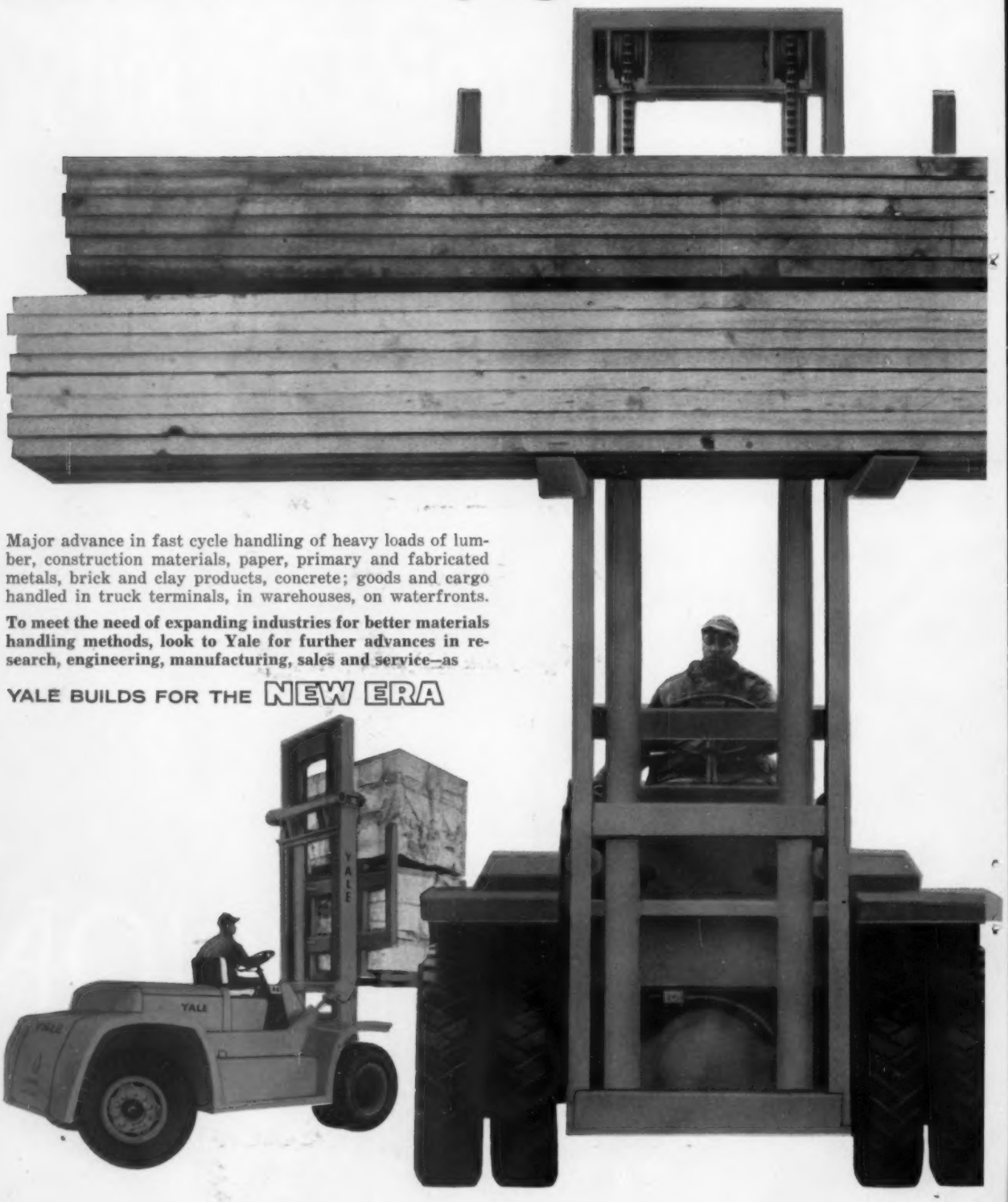
YALE BUILDS FOR THE **NEW ERA**

New Yale High-Capacity Gas Trucks Featuring...

First and only gas truck in

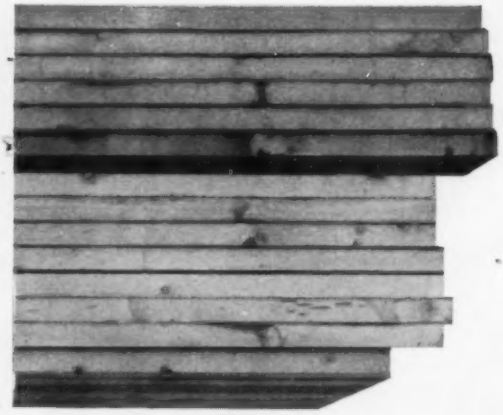


Major advance in fast cycle handling of heavy loads of lumber, construction materials, paper, primary and fabricated metals, brick and clay products, concrete; goods and cargo handled in truck terminals, in warehouses, on waterfronts.

To meet the need of expanding industries for better materials handling methods, look to Yale for further advances in research, engineering, manufacturing, sales and service—as

YALE BUILDS FOR THE NEW ERA

15,000-20,000 lb. capacity with full visibility



YALE
WIDE-ANGLE VISION

300% MORE VISIBILITY THAN ANY OTHER TRUCK OF ITS TYPE! Not just straight-ahead vision—but "corner of the eyes" vision, too—*fully functional* visibility with the big, open look of new Yale High-Capacity Gas Trucks. Operator sits high and in center. Upright channels are wide-spaced, nested to reduce frontal obstruction. Right next to them—the hoisting cylinders, one right, one left. Chains that raise carriage are in front of cylinders—*out* of the arc of vision.

Carriage has one top bar, one bottom bar—good visibility between them at all levels of fork lift. Channel cross members are at channel ends—none between. When an attachment is used, hydraulic hoses are located in front and behind cylinders—not in the line of sight. Whether looking forward or to the rear, the operator sees more. Result: these new Yale trucks with "Wide-Angle Vision" promote safer, faster, more efficient handling of 15,000 to 20,000 lb. loads.

TOP PERFORMANCE UNDER TOUGHEST CONDITIONS

Here are just a few of the premium engineering features—all included as *standard*—that give new Yale Gas Trucks a big edge in stamina and safety under all conditions:

- I-beam side members in frame for extra strength.
- Channels mounted on ball-bearing rollers to reduce friction and wear.
- Ball-mounted, self-aligning hoisting cylinders.
- Gear shift lever, plus hoist, tilt and attachment lever at right side of driver. Directional control lever conveniently located on steering column.
- Power steer with two balanced hydraulic cylinders, one to each rear wheel, to reduce stress on bearing points and linkage.
- Your choice of Yale Fluid Coupling or standard transmission.

GREATER STABILITY. Lifting, lowering, traveling—these Yale trucks keep capacity loads in precision balance! Minimum weaving with full loads, because the trucks are built low—low center of gravity, with high underclearance. Extremely rugged design. Broad lifting base afforded by two ball-mounted lift cylinders. Wide channel-roller spacing at all points of lift, plus side-thrust rollers on channels and carriage, further increase stability factor. Large-size, high-flotation tires give good traction under severest terrain conditions.

FAST CYCLE OPERATION. New Yale High-Capacity Gas Trucks have lifting speeds up to 60 feet per minute; fast, safe lowering; travel speeds up to 20 miles per hour; easy maneuverability.

Designed for complete selection of attachments—engineered for a minimum loss distance.

YALE*

*REG. U. S. PAT. OFF.

INDUSTRIAL LIFT TRUCKS AND HOISTS

YALE & TOWNE

The Yale & Towne Mfg. Co., Materials Handling Div. Manufacturing Plants in Philadelphia, Pa., and San Leandro, California

The YALE & TOWNE Manufacturing Co., Dept. A-475
Roosevelt Blvd., Philadelphia 15, Pa.

Please send the new Yale High-Capacity Gas Truck brochure No. 5230.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

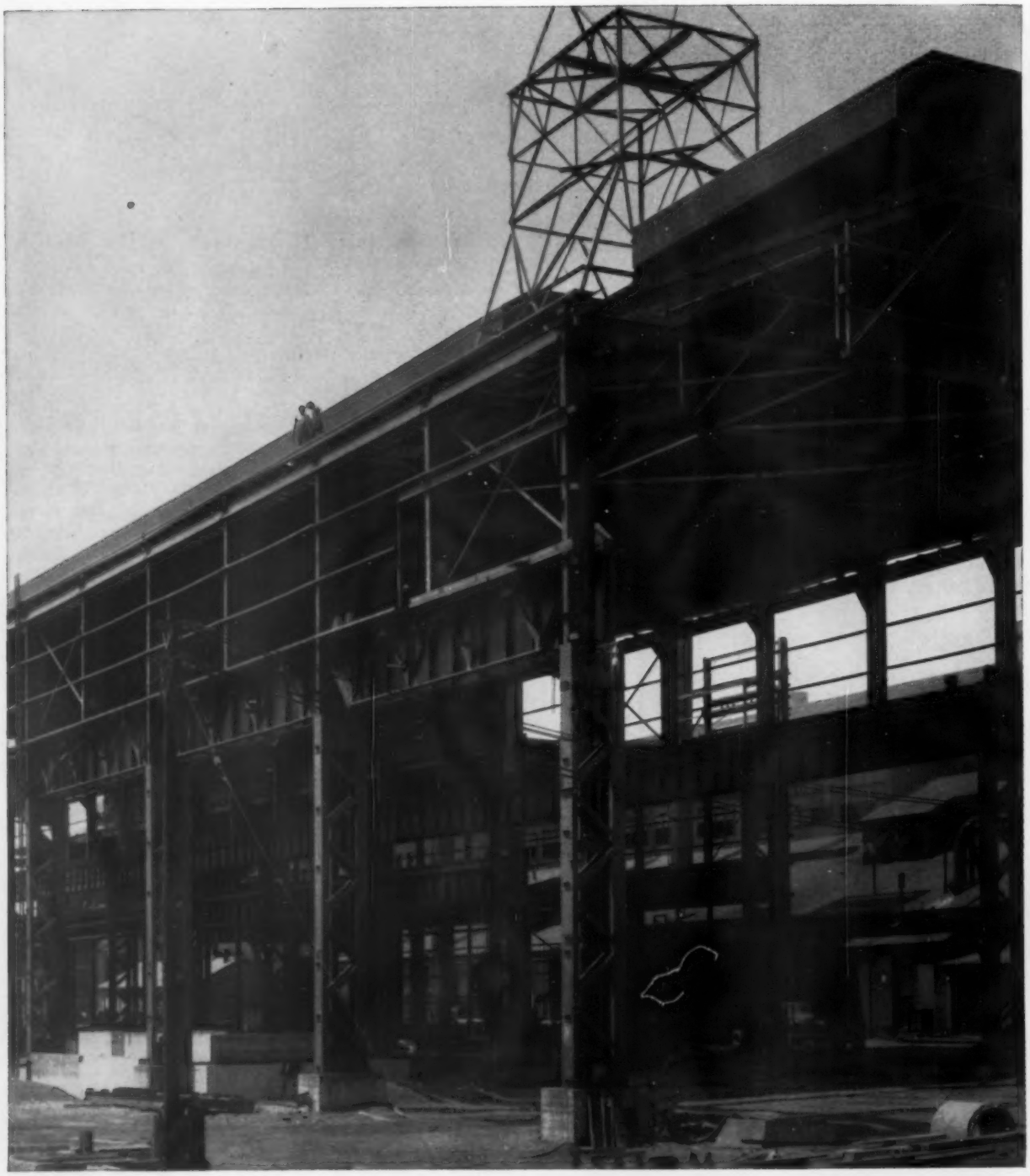
In Canada: write The Yale & Towne Manufacturing Co., St. Catharines, Ontario, Canada

Gasoline, Electric & LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Hand and Electric Hoists

For more facts circle 509 on Reply Card

SHARON STEEL'S NEW

fabricated and erected by



BLOOMING MILL BUILDING

AMERICAN BRIDGE

The structural steel for the big blooming mill at Sharon Steel's Roemer Works, in Farrell, Pa., was fabricated and erected by American Bridge.

In all, American Bridge put 3,000 tons of structural steel into this interesting new mill building, including crane runways, transmission towers, all sheds, shops and bins, as well as installation of overhead cranes, machinery and building foundations, and all sewer and water lines. And, the finished job will be as modern as you'll find anywhere!

What we have done for Sharon Steel, we can do for you. When business dictates expansion and you need new buildings to carry through your plans, call in American Bridge. We shall be glad to discuss in detail our ability to serve you. Contact the nearest office or write direct to our Pittsburgh headquarters.

AMERICAN BRIDGE ..... *General Contractor*

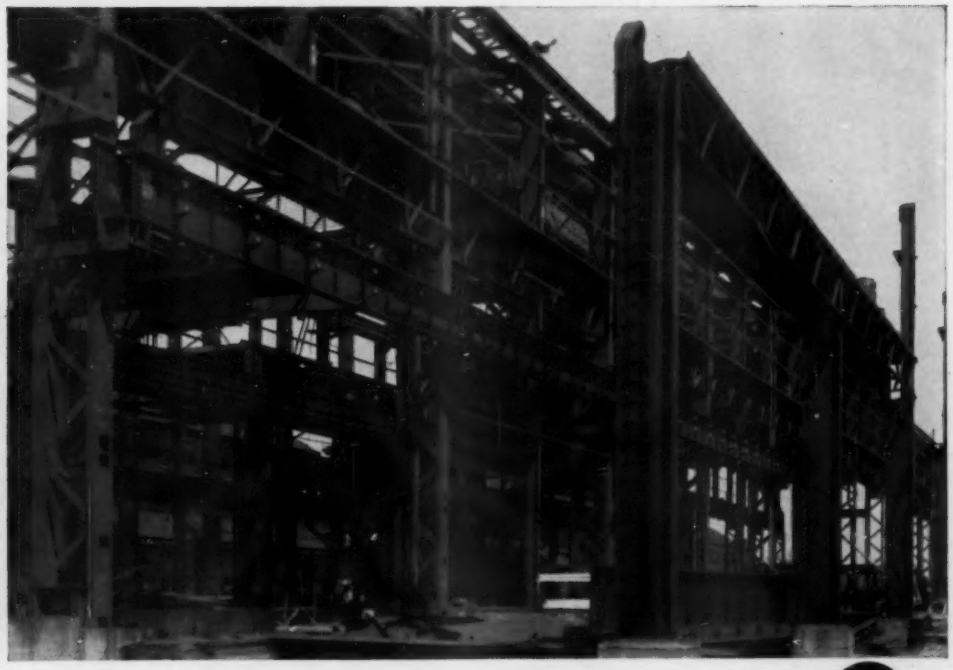
OTHER CONTRACTORS:

ALLIANCE MACHINE CO. ..... *Overhead Cranes*
GENERAL ELECTRIC CORP. ..... *Electrical Equipment*
F. H. McGRAW ..... *Mechanical Installation*
NATIONAL VALVE & MFG. CO. ..... *Piping Installation*
PATTERSON-EMERSON-COMSTOCK ..... *Electrical Installation*
SURFACE COMBUSTION CORPORATION ..... *Soaking Pits*
UNITED ENGINEERING & FOUNDRY COMPANY ..... *Machinery & Mechanical Engineering*

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in: AMBRIDGE • ATLANTA • BALTIMORE • BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND DALLAS • DETROIT • DENVER • ELMIRA • GARY • HOUSTON • LOS ANGELES • MEMPHIS • MINNEAPOLIS • NEW YORK • ORANGE, TEXAS • PHILADELPHIA • PITTSBURGH • PORTLAND, ORE. • ROANOKE • ST. LOUIS • SAN FRANCISCO • TRENTON

UNITED STATES STEEL EXPORT COMPANY, NEW YORK



UNITED STATES STEEL

For more facts circle 510 on Reply Card

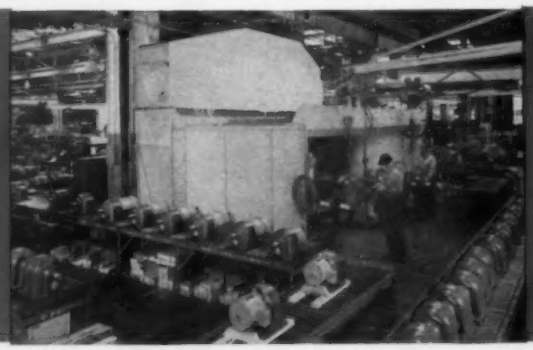
What do you need

Quick delivery from stock... LINK-BELT enclosed drives offer exact, efficient answers to any combination of service factors—ratio, speed, hp, load

COMPACT, CAST IRON, CORROSION-RESISTANT HOUSINGS prevent oil leakage . . . provide great rigidity . . . maintain permanent alignment of all parts. In addition, Motogear, Gearmotor and In-Line helical gear drive housings provide for the latest NEMA motor sizes.

CHANCES are that every production operation in your plant requires its own combination of drive characteristics. And Link-Belt's complete line of speed reducers gives you the right answer to every need every time . . . plus convenient, one-source supply. Each drive is designed in response to a basic industrial requirement . . . with types

CAREFUL ASSEMBLY OF PRECISION PARTS assures proper fit, long life. Here operator assembles gear and bearings on shaft. Sturdy bearings protect against shock and overloads. Hardened gears produced on modern hobbers are shaved, assuring efficient power transmission.



MODERN PRODUCTION-LINE FACILITIES assure the economies of mass production plus abundant supply. From initial manufacturing stages through final inspection, facilities and techniques—including this spray painting operation—are among the most modern in industry.

in speed reducers?

for specific variations in service conditions.

Link-Belt also makes industry's most extensive line of related power transmission products, and can supply complete, job-mated, pre-engineered drive combinations. The next time you need a drive, see your Link-Belt district office or authorized stock-carrying distributor. Ask for literature.

LINK-BELT

ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,579

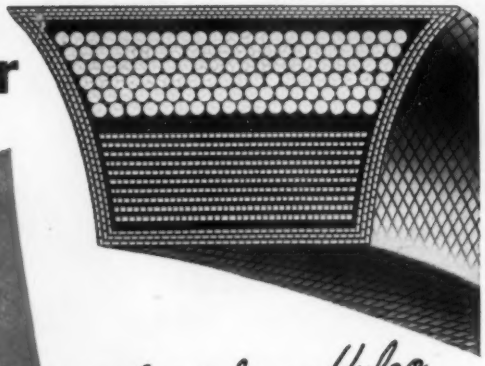
LOAD TESTING with the latest in instrumentation is one of many Link-Belt quality controls. Such thorough tests are your assurance that the drive you buy is leak-proof . . . all parts are properly aligned . . . unit is effectively insulated and sealed for long, trouble-free performance.

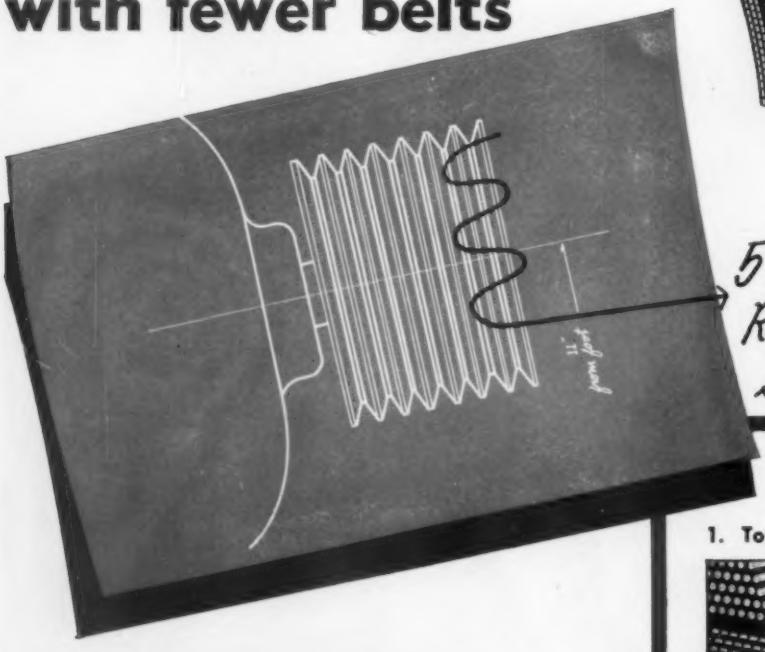
SOUND TESTING with sensitive sound-level meters provides additional proof that drives are in perfect working order. Extreme quietness of Link-Belt enclosed drives is the result of perfect mating of gears and sound-dampening property of cast iron housings.

For more facts circle 511 on Reply Card

Cut sheave width and weight...

get same horsepower with fewer belts





5 Gates Super Vulco Ropes do the work of 7 standard V-belts

Where space is limited and weight a factor, design your drive with this important fact in mind:

5 Gates Super Vulco Ropes do the work of 7 standard V-belts

That's because a Gates Super Vulco Rope has 40% more horsepower capacity — delivers more horsepower per dollar invested than any standard V-belt drive. Sheaves with fewer grooves cost less . . . weigh less . . . take less room. Drive design is invariably improved.

A wealth of drive data is quickly available to you. Simply call your nearby Gates distributor for a Gates V-belt specialist. Stocks carried in industrial centers around the world.

The Gates Rubber Company
Denver, Colorado

GATES Distributors are in the Yellow Pages

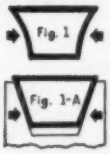
The Mark of Gates *Specialized* Research

No other V-Belt has ALL these advantages

1. Tough, resilient Tensile Cords

Super strong resilient tensile cords provide 40% greater horsepower capacity . . . easily absorb heavy shock loads . . . reduce number of belts required . . . save weight and space.

2. Concave Sidewalls (U.S. Pat. 1813698)



Concave sides (Fig. 1) increase belt life. As belt bends, concave sidewalls become straight, making uniform contact with sheave groove (Fig. 1-A). Uniform contact means less wear on sides of belt . . . far longer belt life.

3. Flex-Weave Cover (U.S. Pat. 2519590)

A Gates exclusive: provides greater flexibility with far less stress on fabric. Cover wears longer . . . increases belt life . . . more power available to driven machine.

4. High Electrical Conductivity

Built into Gates Super Vulco Ropes for safer drives (in explosive atmospheres).

5. Oil, Heat, Weather Resistant

Special rubber compounds make Super Vulco Ropes highly resistant to heat, oil, and prolonged exposure to weather.

TPA 248

Gates Super VULCO ROPE Drives

For more facts circle 512 on Reply Card

BULLETINS just released and of immediate plant interest

Reader Service Cards for ordering bulletins are on pages 263-264. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

CONSTRUCTION

101 Steel Buildings—Manual SX-14456, 8 pp, features the Steelox panel method of construction. Among industrial buildings and others illustrated are frameless, rigid frame, shed roof and utility types. Accessories and special features of the steel buildings are also covered. Simplified construction, neat appearance, low maintenance, and other advantages are touched upon. Armco Drainage & Metal Products, Inc.

102 Aluminum Curtain Walls—General design data on various types of curtain wall construction are featured in company's 16-pp 1957 catalog. Construction details are illustrated with drawings, and specifications are included, as well as photos, some in color, of typical installations. Michael Flynn Mfg. Co.

103 Grating and Treads—Bulletin 2527 is a 26-pp, illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electroforged, riveted, rectangular, diagonal, U-type and T-interlocked grating and treads. Tables of safe loads and information on specifying are also included, as well as photos of typical applications. Blaw-Knox Co.

FASTENERS, SMALL PARTS

104 Stainless Steel Fasteners—Catalog 56-A, 24 pp, lists some 7000 stainless steel fastenings. Among company's new products listed are continuous or piano-type stainless steel hinged and butt hinges in blank, fixed pin, and loose pin types. Cap screws, nuts and washers, machine screws, wood screws, and pipe fittings are covered. Catalog gives tips on ordering, and discusses replacement of "specials" with "standards," and differences between thread types. Also provides specifications and corrosion resistance tables. Star Stainless Screw Co.

105 Small Metal Parts—Catalog 21, 44 pp, describes a variety of standard lugs, clips, terminals, wire forms, grouped according to most common use. Catalog contains a "designer's sketchbook" section showing standard parts together with thumbnail detail drawings. Also shown are special parts designed to specifications for unusual applications. Book explains advantages of having small metal parts treated with company's hot tinning or solder coating processes. Zierick Mfg. Corp.

MATERIALS HANDLING

106 Freight Car Handling—Bulletin T-124 is a performance report explaining how unloading capacity, freight handling efficiency and furnace production are increased with use of Trackmobiles, for switching, spotting and hauling operations. Functions of the units in one typical plant are described and general features and advantages detailed. Whiting Corp.

107 Bridge Cranes—Bulletin DH-459A describes B-47 hand traveling crane available in capacities of 3 tons to 10 tons with spans up to 50 ft. Contains data on construction details, weights, dimensions and other general information of interest to plant engineers. Wright Hoist Div., American Chain & Cable Co.

108 Overhead Tow-Conveyors—Catalog 157, 42 pp, covers design, features and applications of the in-floor Towveyor and overhead Tow-Conveyor systems. Advantages of the systems are fully described, and mechanical details are provided for component parts of both types. Typical layouts and engineering drawings for each part are also included, as well as installation information. Numerous photos and drawings illustrate typical installations. Jervis B. Webb Co.

109 Brewery Conveyors—Reprint ADM-39 is a technical article on a pneumatic conveying system in a brewery. Tells how problems of maintaining high sanitary standards and quality control were overcome. Complete malt and grits handling operation is detailed. Photos show air-materials separator, conveyor ducts and filters for grits, exhauster station of the malt-handling system, weigh hopper, and grits receiver used in the system. Fuller Co.

110 Conveyor Belts—Catalog 25 CB, 22 pp, on conveyor and elevator belts, covers new style designations of general service heavy duty conveyor belts made with special strength members. Gives tension ratings for vulcanized and metal splices, minimum recommended pulley diameters, and minimum belt width for good troughing. Also described is a complete line of hot material belts for temperatures from 150 to 350 F and grain belts for oily and non-oily whole or cracked grains. Manhattan Rubber Div., Raybestos-Manhattan, Inc.

111 Lift Trucks at Work—How a cannery can operate and maintain its fleet of 14 trucks for $1.87 a day per truck is told in the Spring 1957 issue of the Lever. Other articles in this 16-pp publication deal with such attachments as the hydrafork and load stabilizer. This and other issues of the Lever are available to qualified plant engineers. Lewis-Shepard Products, Inc.

112 Storage Racks, Bins—Many innovations in the Sturdi-Bilt adjustable storage rack and steel bulk bin lines are described in two bulletins offered by the company. Bulletin BB-956 covers steel bulk bins, with easy-to-follow charts for planning storage needs, and diagrams demonstrating construction principle for instantaneous readjustments. Bulletin SR-956, 8 pp, covers adjustable storage racks, with specification chart, suggestions for multiple uses, and photos of typical installations of this storage equipment. Sturdi-Bilt Engineering Co.

SLINGS AND WIRE ROPE

114 Woven Wire Slings—This 18-pp catalog describes Gripper woven wire slings. Illustrates and describes the slings in detail. Shows typical applications for the slings and includes dimensions and complete price information. The Cambridge Wire Cloth Co.

115 Wire Rope Selection—By means of photos and drawings with reeving diagrams, 6-pp Bulletin 5702 lists proper wire rope specifications for many types of construction equipment. Includes discussion of lang lay vs regular lay rope, proper constructions and proper wire rope to use for clamshell bucket operation. Macwhyte Co.

PUMPS, PUMPING

116 Rotary Gear Pumps—How to solve pumping problems with rotary gear pumps is explained in this 36-pp catalog, recently re-offered to plant engineers. Includes a general explanation of rotary gear pumps and discusses factors of pumping problems. Sample problems are presented, along with conclusions. Technical data section covers friction loss in hose, friction loss in pipes, friction loss through fittings, cylinder displacements, viscosity crankcase oils, viscosity fuel oils, viscosity conversion chart, viscosities and specific gravity of common liquids, and other pumping information. Geo. D. Roper Corp.

117 Simple Little Pump—This 8-pp bulletin describes the Magnaflow, a fractional horsepower, centrifugal pump of extremely simple design and great versatility. Explains how the pump works, what it does and where it's used, including a list of more than 40 fluids handled. Component parts are illustrated. Also provided are capacity data, maintenance and installation tips. The Corley Co., Inc.

118 Pumps and Pump-Motors—Catalog 957, 12 pp, describes and illustrates complete line of company's products and shows specifications in compact tabulated form. Text covers rotary pumps and hydraulic pump-motors, fully amplified with photos, drawings and diagrams. Geo. D. Roper Corp.

119 Piston Pumps—Bulletin 9900-A, 8 pp, describes vertical and horizontal "Oil-Rite" reciprocating pumps designed for a variety of high pressure installations (up to 1000 psi and 35 gpm). Contains performance tables, dimensions, construction features and lists of accessory equipment. The Deming Co.

LUBRICATION

120 Large Displacement Lubricators—Complete instructions for servicing and operating large displacement lubricators actuated by a moving machine element are included in this service instruction sheet. Large photos of the vertical unit, closed filter unit and horizontal unit types are shown, as well as 16 types of meter-units. Specification tables included. Bijur Lubricating Corp.

121 Automatic Gear Spraying—Versatal gear spray equipment designed to accomplish a dangerous lubrication problem with safety and with a savings of up to 80 per cent of gear lubricant—with no machine shut-down—is described in this 6-pp bulletin. Drawings illustrate proper way to assemble gear spray units. Alemite Div., Stewart-Warner Corp.

MECHANICAL POWER TRANSMISSION

122 Speed Reducer Data—Bulletin 1105 combines in one 24-pp book complete information on concentric shaft and right angle speed reducers for applications up to 140 hp (up to 72,000 lb-in. output torque). Ratings are given, as well as dimensions, overhung load and thrust capacities. Horsepower selection tables show readily: standard output speeds obtainable with commonly used input speeds, and full range of hp ratings available for each standard output speed. The Falk Corp.

123 Roller Gear Drives—Bulletin 107A describes roller gear drives for precision indexing of O.E.M. machines and instruments with low torque requirements and a need for indexing rates up to 2,000 rpm. Load ratings and dimensions are given for 19 standard units with from 3 to 12 stops and indexing periods of 120, 180 and 270 deg. Ferguson Machine Corp. of Indiana.

124 Magnetic Drives—Data on design, drive features, operating and performance curves, output torque rating-dimensions, selection chart, as well as photos of installations and applications are included in 6-pp Bulletin W-T 1-57. Whitney Chain Co.

125 Split Ballbearings—Advantages of company's fracture process of manufacturing split ballbearings are fully detailed in 26-pp Catalog 57. The fractured race technique is described and illustrated, and typical applications are listed. Complete specification data on various types of split ballbearings in the line are also included, as well as photos, drawings and diagrams illustrating details of design and construction. Split Ballbearing Corp.

126 V-Belt Economy — Disadvantages of makeshift and other ill-advised means of coping with stretched or broken V-belts are discussed briefly in this folder. Answers questions on V-belt maintenance, inventory, wear, vibration. It features Veelos adjustable link V-belting for which manufacturer claims less vibration and faster belt changing. The Manheim Mfg. & Belting Co.

127 For Longer Belt Life—Simple precautions to prolong life of V-belts, increase drive efficiency and thereby assure full continuous production are contained in 12-pp Bulletin 20X6234C. Describes various types of belts and tells how to select and match them. Correct installation of belts, common causes of belt destruction are covered along with preventive measures. Allis-Chalmers Mfg. Co.

FILTERING

129 Filter Guide—This 8-pp general bulletin illustrates six major filter types for industrial applications: disposable media gravity type, combination gravity and magnetic, straight magnetic, vacuum, pressure and screen-type settling

BULLETINS

(Begins on page 21)

filters. Applications covered include all types of fluids from water to heavy viscosity oils. Descriptions of filter operation are given as well as applications, degree of filtration and flow rate capacities. Industrial Filtration Co.

130 Pressure Filters—Publication 6321 describes company's standard Type C vertical pressure filters for commercial buildings, institutions, small industrial plants. These filters serve to remove suspended matter, turbidity, dirt, rust, oil and color commonly found in surface waters. Details of operation, sizes and capacities are given. Cochrane Corp.

ELECTRICAL

131 Single-Phase Motors — Bulletin GEA-6240A, 8 pp, illustrates specific advantages of single-phase capacitor type motors, ½ hp, 115/230 v, 60 cycles, for materials handling, wood- and metal-working equipment, pump and compressor, fan and blower, refrigeration and air conditioning, and other applications. Dimension data for estimating is given on dripproof, resilient-base, and totally enclosed fan-cooled motors. Rating and type charts are included. General Electric Co.

132 Induction Motors—Bulletin GEC-1420 contains application data on dripproof and enclosed polyphase induction motors, 1-5 hp; frames 182-215; 208-220/440, or 550 v; 60 cycles. Includes charts showing single-speed ratings and frame sizes, typical speed-torque curves, starting torque values, and starting and full-load currents. Cutaway views show construction features. General Electric Co.

133 Door-Operator Motors—Bulletin GEA-6299 gives application and design features on door operator motors ⅙ hp through ¼ hp for commercial and industrial applications. Illustrated bulletin contains information on application engineering aid offered, as well as selection chart giving motor types, sizes, ratings, reversing characteristics. General Electric Co.

134 Low Voltage Switchgear—Basic types, application and advantages of this manufacturer's circuit breaker switchgear are presented in 36-pp Catalog 200. Fully illustrated, booklet covers drawout air switchgear, stationary air circuit breaker switchgear and molded case breaker switchgear. General assembly and components are discussed and illustrated, and dimensional and layout information provided. Information on instrument transformers and bus duct connection is included. Switchgear voltages are 600 v a-c, 250 v d-c. Continental Electric Equipment Co.

135 Switchgear Maintenance — "Guide to Metal-clad Switchgear Maintenance," 8-pp, outlines a product maintenance program for medium voltage, metal-clad type switchgear and air-magnetic and oil-filled types of power circuit breakers. This publication (No. GER-1282), includes photos which depict various phases of inspection and maintenance, and contains a quick-reference trouble-shooting chart. General Electric Co.

136 Drum and Cam Switches—Bulletin GEA-6307A, 8 pp, covers drum and cam switches for manual and automatic control of wound-rotor, squirrel cage, d-c series, and compound-wound motors. Describes features of the units; lists continuous operation requirements; discusses various applications of drum and cam switches; and provides dimensions and selection data. General Electric Co.

137 Time Delay Relay—Bulletin SR3 describes a time delay relay, consisting of a pneumatic timing head, a solenoid assembly, a switch and terminals. Contact and terminal arrangements are diagrammed and complete specifications included. AGA Div., Elastic Stop Nut Corp. of America.

138 Instrument Transformer Guide—Catalog GEC-1028B is an 86-pp buyer's guide to instrument transformers. Designed to save time in selecting and ordering current transformers, potential transformers, and metering outfits, it supplies pertinent data, including prices, on all standard types. Gives information on accuracy, insulation, strength, application, thermal conductivity, etc. Complete information can readily be obtained from leaflets on individual types, references to which are made in the text. Data is presented in convenient tabulated form, fully illustrated with photos. General Electric Co.

139 On Instrument Transformers—Catalog 61S8528, 24-pp, covers theory and operation of instrument transformers. Deals with metering applications and gives examples of connections. Presents many ASA standards in easy reference form and shows typical current and potential transformer performance curves. A handy ratio-phase correction chart is included. Allis-Chalmers Mfg. Co.

140 Autotransformers—Bulletin GEC 1433 gives application tips; prices, dimensions and model numbers; and selection data on dry-type specialty transformers, single- and three-phase, 50 and 60 cycles, for boosting or bucking voltage on single- and three-phase circuits in indoor or outdoor service. Includes connection diagrams. General Electric Co.

141 Wire and Cable—Construction, voltage ratings and other specification data on Plasticord and Plasticote wire and cables are featured in this 6-pp bulletin. Wire and cables for a variety of applications are pictured and described. Chester Cable Corp.

142 Plug-In Busway—Bulletin GEC-1446, 8 pp, describes a combination feeder, plug-in busway rated from 600 to 4,000 amp, 600 v or less. Provides application and descriptive information, ratings, dimensions, operating characteristics, and construction details. General Electric Co.

143 Power Rectifiers—Two bulletins covering company's three lines of d-c power rectifiers are announced as available. Eight-pp Bulletin AC-57A lists automatically regulated power rectifiers of either selenium or silicon, for application where closely regulated d-c voltage is required. Bulletin AC-57-R covers a manually controlled rectifier, for applications requiring moderately stabilized d-c voltage. Christie Electric Corp.

144 Pushbutton Stations — Standard and heavy-duty pushbutton stations are described in 8-pp Bulletin GEA-6544. It gives features, ordering information, dimension data, and applications, and includes photos showing extent of each line and illustrations showing features of heavy-duty types. General Electric Co.

145 Industrial Batteries—Sixteen-pp Booklet GB-178B is designed to help industrial battery buyers select most economical and efficient battery for their operation. It outlines significance of battery design, and the contributions of research and development to lower operating costs, greater productivity. Selection, correct charging and handling, maintenance and other aspects of battery usage are outlined. Gould-National Batteries, Inc.

146 Truck Battery Manual—Eight-pp Bulletin GB1567B describes company's new Thirty battery developed for sustained power requirements of industrial electric trucks. Gives details of battery construction. Also lists complete engineering specifications for 40-, 60- and 120-amp-hr capacities available, and data on discharge indicator. Tabulates length and width dimensions for grouping of cells in wood or steel trays of rider-type trucks, as well as terminal connector specifications. Gould-National Batteries, Inc.

147 Solenoids, Coils, Components—This 8-pp catalog gives in complete detail, pictures and diagrams with pertinent information on solenoids, coils and electrical components. Typical applications are enumerated and special features described. Anderson Controls, Inc.

On pages 263-264 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

Practical Suggestions on Lamps and Lighting

149 Incandescent Lamp Manual—This 24-pp incandescent lighting guide book covers more than 1,800 types and sizes of incandescent lamps. It features sections on characteristics of incandescent lamps, structure, a discussion of its filaments, bulb sizes, glass types and finishes, types of lamp bases. A special section states performance characteristics, with detailed and simple charts and graphs. Major types of incandescent lamps are discussed and illustrated, and maintenance and servicing are covered. Sylvania Electric Products Inc.

150 Industrial Lighting — Illustrated solutions to 25 common industrial lighting problems are presented in this 50-pp catalog. They show how lighting was used to boost production in quality and quantity, improve worker morale and reduce number of accidents. In each of the typical installations pictured, estimated hourly cost a footcandle for each 10,000 sq ft is provided. Large Lamp Dept., General Electric Co.

WELDING, HARD FACING

151 Resistance Welders — Special Machine Bulletin 8-413, 10 pp, describes 32 multi-spot and projection resistance welding machines produced by the company. Lists for each welder: end product, type of operation, production rate and associated materials handling equipment. Products covered include automotive parts, appliances, precision instruments, electric motors and basic steel. The Taylor-Winfield Corp.

152 Three-Phase Welders—Tri-Phase Bulletin 10-813-A, 12 pp, describes three-phase resistance welding machines for use where present electrical power supply is not adequate and cannot readily be reinforced to make it capable of handling conventional a-c welding equipment, or where an existing installation of a-c equipment has been causing trouble. Lists locations and production conditions suitable for three-phase welders, explains operational principles, describes associated control equipment. The Taylor-Winfield Corp.

153 Hard-Facing Electrodes—"Rexarc Engineered Toughness" is a 20-pp manual on hard-facing and manganese electrodes. A procedure section illustrates typical buildup and hard-facing applications for better wear resistance. Recommended procedures are shown, together with type and quantity of material required, and range of machine settings for each. A directory of uses, by industries, lists worn parts that can be rebuilt, and names proper electrode for purpose. Although not a text on welding, this book presents many aids to the welder. The Sight Feed Generator Co.

VALVES, TRAPS AND PIPING ACCESSORIES

154 Control Valves—Specifications S 810-11 and S 810-12 give details of construction on single-seated and double-seated diaphragm control valves. Included are sizes, materials, plug characteristic curves, dimensions and a cross-section drawing of each type. Industrial Div., Minneapolis-Honeywell Regulator Co.

155 Tin-Lined Piping, Valves—Bulletin 139 describes tin-lined pipe, fittings, line valves, faucets and accessories developed to protect distilled or demineralized water from metallic contamination. With them, purified water may be piped throughout an entire building, from point of origin to point of use. Barnstead Still & Demineralizer Co.

156 Air Control Valves—Sixteen-pp Catalog 105 describes pilot operated poppet-type air control valves manufactured by the company. Contains complete dimension, installation, application and operation data in an easy to use form, and describes features of the valves in detail. Photos, drawings and diagrams are included. Galland-Henning Nopak Div.

157 Hydraulic Pilot Valve—This catalog sheet describes company's spring loaded, diaphragm actuated hydraulic pilot valve. It contains photos, cutaway diagrams, descriptions of valve features, and recommended applications and specification instructions. Atlas Valve Co.

(More Bulletins on page 265)

new!

NOW JOY BRINGS YOU THE WN-224... *Largest* "PACKAGE"-TYPE COMPRESSOR YET... UP TO 1000 HP

Here's a *new* approach to air compression in the 2418 to 6048 cfm range. Instead of long, heavy horizontal units resting on massive foundations, the Joy WN-224 has four cylinders arranged semi-radially around the frame. This compact, balanced arrangement assures smoother running, gives longer, longer service with far less maintenance.

Installation is greatly simplified—there is no assembling or aligning—just bolt it down, connect power, water and air lines—and you're ready for long, continuous service.

Joy has had years of experience with semi-radial design—pioneered it and proved it in hundreds of installations of the WN-114, a close cousin to this newer machine. Look over this specification chart . . . if you use compressed air in these volumes and pressures, you should find out more about the WN-224. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WSW I-6607-174

JOY ... EQUIPMENT FOR INDUSTRIAL PLANTS ... FOR ALL INDUSTRY

WRITE FOR FREE BULLETIN 174-15

Industrial Compressors

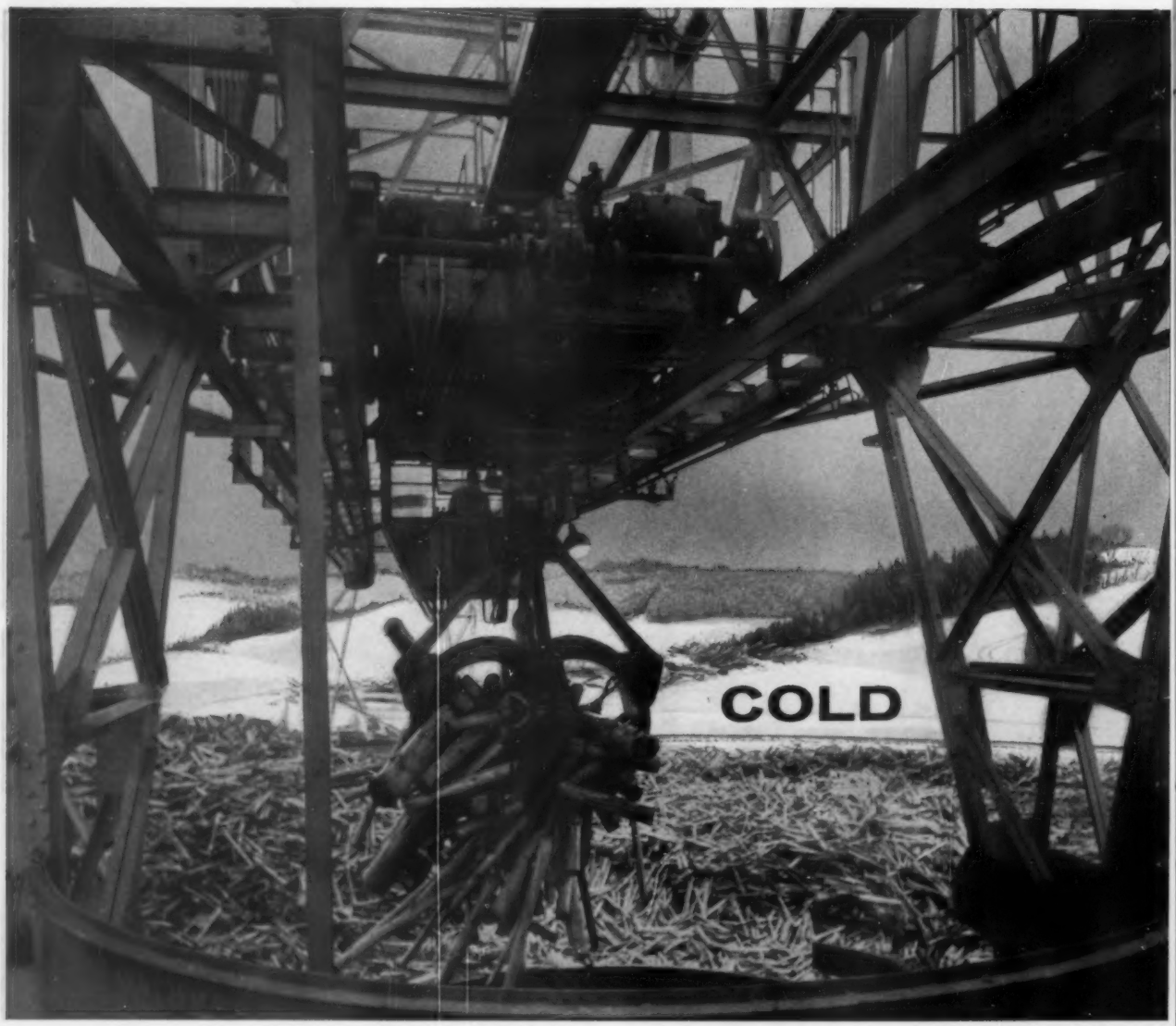
Conveyors

Electrical Connectors

Fans and Blowers

For more facts circle 513 on Reply Card

New! Multi-purpose



Gulfcrown stands up to cold. It pumps easily in coldest weather at temperatures of 0°F. and below.

GULFCROWN Grease

does the work of many greases —withstands heat, cold, water

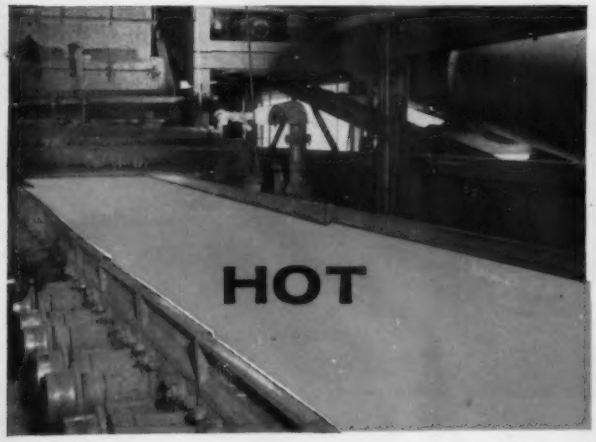
It's a fact—you can use Gulfcrown practically anywhere! On plain or antifriction bearings. In paper mills, textile mills, steel mills, power plants. Outside or inside. You name it, chances are Gulfcrown will lubricate it—but good! Operating conditions can be hot, cold or wet . . . this tough all-purpose grease does its job regardless.

You can see how one multi-purpose grease that does the work of many is a big money-saver. It reduces inventory, cuts lubricating costs and prevents application errors. Check the saving yourself—test Gulfcrown. Ask your Gulf sales engineer or write for free literature.

GULF

GULF OIL CORPORATION
1822 Gulf Building, Pittsburgh 30, Pa.

Gulfcrown resists heat. It won't get thin, won't run out of bearings even at 250°F.



Gulfcrown sheds water—won't wash away. That's why it's a good rust preventive, too, under the dampest conditions such as this wet end of a paper machine.

For more facts circle 514 on Reply Card

For more facts circle 515 on Reply Card →

GENERAL ELECTRIC LIMITAMP* STARTERS OFFER 30"-DEEP ENCLOSURES WHICH CUT SPACE NEEDS IN HALF

Today you can install General Electric air-break Limitamp starters in half the space normally required by the old-style, 60-inch-deep, high-voltage motor control. In addition to the small compact enclosure (30" deep, 38" wide, 90" high), Limitamp control units are designed for complete front connection, thus eliminating the need for a back aisle. These two features of Limitamp starters assure maximum utilization of available floor space.

Front connection of General Electric Limitamp control also means greater flexibility of arrangement. Units can be mounted back-to-back, back-to-wall, or free standing.

ONLY LIMITAMP CONTROL OFFERS ALL THESE FEATURES

Space savings and flexible arrangement of units are but two of the benefits of G.E.'s Limitamp control. There are many more. For instance:

- Easy installation made possible with roll-out contactor unit and front-connected devices.
- Increased personnel safety provided by three-phase disconnect switch.
- Extra five-square-foot space savings on large motor applications by using higher-capacity fuses to eliminate need for extra fuse cabinet.
- Completely co-ordinated electrical design to give optimum equipment protection.

TAKE ADVANTAGE OF THESE BENEFITS NOW

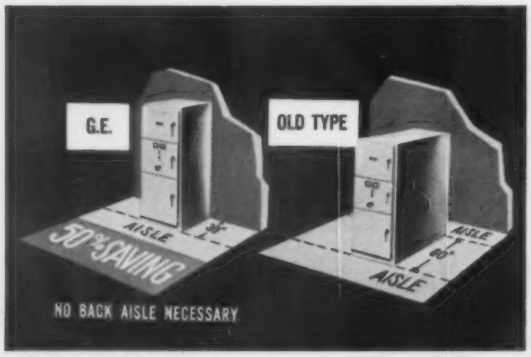
Don't be satisfied with "old-fashioned" high-voltage motor control: specify General Electric's Limitamp control—*leader in design and performance*. Contact your G-E Apparatus Sales Office today, or write Section 783-3, General Electric Company, Schenectady, New York.

Industry Control Department, Roanoke, Virginia

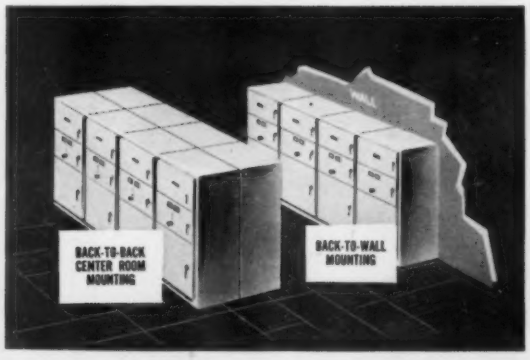
*Reg. Trade-mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC

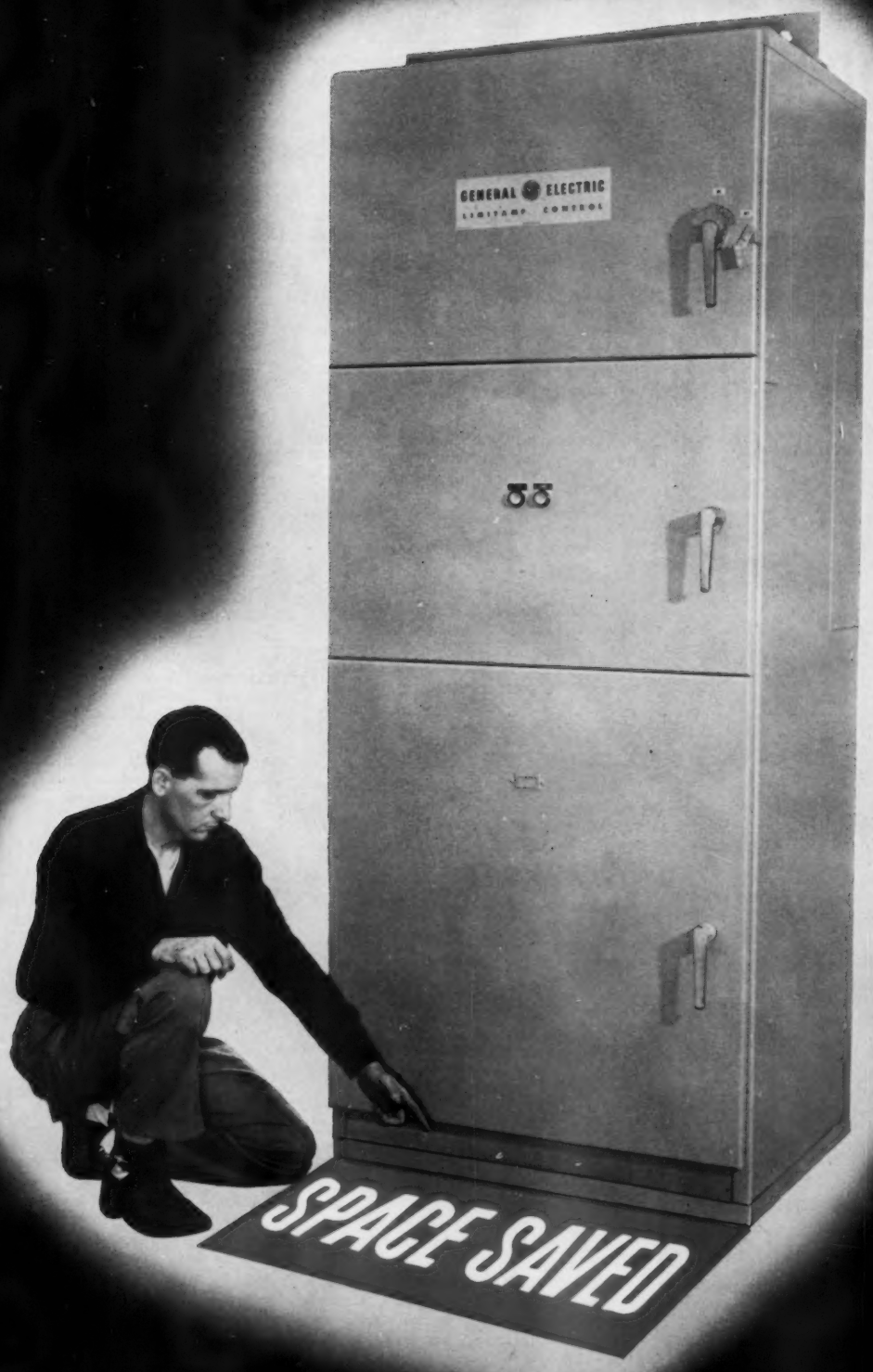


ELIMINATION OF BACK AISLE plus 30-inch-deep Limitamp control units results in floor space savings of 50%.



FLEXIBLE ARRANGEMENT—back-to-back, back-to-wall, or free standing—since units are front connected.

...LEADER IN DESIGN AND PERFORMANCE



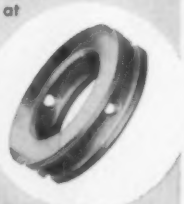
DOUBLE TROUBLE STOPPED by CHEMPRO TEFLON*

In high speed pumps handling highly corrosive chemicals, Chempro Teflon has drastically cut pump down-time caused by scored shafts and short packing life.

"Scored" Shafts

eliminated by using CHEMPRO TEFLON SEAL CAGES†. Last many times longer than metal lantern rings under continuous corrosive attack. Snap on and off shaft quickly and easily. No vibration at high speeds. Can stand high gland pressures.

†Patented



Short Packing Life

solved by using CHEMPRO TEFLON RING PACKINGS. Give months of leak-free service compared with days and even hours for conventional packings. Require only slight gland pressure. Low coefficient of friction often makes lubrication unnecessary.

Complete information given in Bulletin CP552

*duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 516 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Help Wanted

PLANT ENGINEERING:

"We are looking for published material on what fabricated metal manufacturers are spending on maintenance in their plants.

"Maintenance in such cases should include maintenance and repair of machinery and equipment, and maintenance and repair of plant, including janitorial services and plant protection. We are interested in ratios such as maintenance cost to total shop payroll, or departmental maintenance cost to total department cost, etc.

"Can you refer us to any recent articles in your publication that might help us. Any material you might have available on the subject would be sincerely appreciated." *Sidney Brunell, Comptroller, Smithcraft Lighting Div., A. L. Smith Iron Co., Chelsea, Mass.*

▶ Certainly, there is no easy answer to maintenance control and practically no method of arriving at comparative costs between two plants even in the same field. This places a great responsibility on the plant engineer and other maintenance and construction personnel, but it is just one more facet of the continued requirements for better trained and more specialized technicians and engineers. However, in the hope that it will provide some pointers toward establishing cost ratios, we have forwarded some material to Mr. Brunell.—*Editors.*

Industrial Ventilation

PLANT ENGINEERING:

"The manual for Modern Plant Ventilation Practice by K. E. Robinson of the General Motors Research Staff, received with PLANT ENGINEERING, has been read with great interest.

"The copy received has been filed in the Engineering Office for reference purposes and an extra copy of the above manual is desired for my personal use." *G. J. Nash, Mechanical Engineer, Kirkland, Washington.*

PLANT ENGINEERING:

"Mr. Robinson is to be congratulated on an excellent and factual presentation of a controversial subject in his article 'Industrial Ventilation,' published in the February, 1957 issue of PLANT ENGINEERING.

"We have had many years of experience in relation to industrial ventilation including design maintenance and operation. We blush to admit the design of many installations certainly did not provide the degree of human comfort we had intended.

"We hope Mr. Robinson's article will prove as helpful as we think it should in providing design engineers with some common-sense rules for more effective industrial heating and ventilating to provide improved comfort conditions.

"We are of the opinion that a similar article published pertaining to office ventilation would receive a like interest and approval." *William B. Pride, Plant Services Engineer, Boeing Airplane Company, Seattle, Wash.*

▶ Reprints of this eight-page manual on industrial ventilation are available to our readers.—*Editors.*

Lubrication and Maintenance

PLANT ENGINEERING:

"I would appreciate reprints of any articles concerning setting up of an oiling schedule for machine tools and scheduled inspections for machine tools to determine the necessity for rebuilding this equipment.

"My memory says I read articles of this nature in PLANT ENGINEERING but cannot remember the issue." *George M. Brown, Assist. Plant Engineer, Automatic Transportation Co., Chicago, Ill.*

PLANT ENGINEERING:

"In reference to preventive maintenance, we are in the process of programming a preventive maintenance program for a chemical plant.

"We would appreciate receiving any information pertaining to maintenance which would be of value to us in setting up a preventive system and improve maintenance procedures in general." *M. Lissner, Plant Engineer, Velsicol Chemical Corporation, Chicago, Ill.*

▶ Tear sheets of articles of interest to both these readers have been mailed to them. We hope the information will help them solve some problems.—*Editors.*

Controlling Corrosion

PLANT ENGINEERING:

"We would very much appreciate receiving two copies of an article which appeared in the February, 1957 issue of PLANT ENGINEERING.

"The article, by John L. McPherson, was entitled 'How Good Design Controls Corrosion' and appeared on page 101.

"We would appreciate receiving other parts of this article if they are available, or information on this or related subjects." *Pat Young, Librarian, National Petro-Chemicals Corp., Tuscola, Ill.*

PLANT ENGINEERING:

"I have just read with considerable interest the article 'How Good Design Controls Corrosion, Part II,' by John L. McPherson in the February, 1957 issue of PLANT ENGINEERING.

"The problems encountered here are in relation to corrosive solutions and acids used in the finishing of metal parts including sulphuric and nitric.

"I was interested in reading the article

BETZ LABORATORIES

REGISTERED PROFESSIONAL CHEMICAL ENGINEERS

W. H. & L. D. BETZ

Chemical Engineers

CONSULTANTS ON ALL WATER PROBLEMS

GENERAL OFFICES AND LABORATORIES
GILLINGHAM AND WORTH STREETS
PHILADELPHIA 24, PENNSYLVANIA

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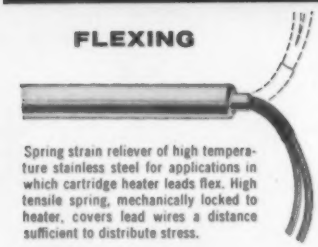
GENERAL OFFICES | ENGINEERING HEADQUARTERS
GILLINGHAM & WORTH STREETS, PHILADELPHIA 24, PA.

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

TAKE YOUR PICK!

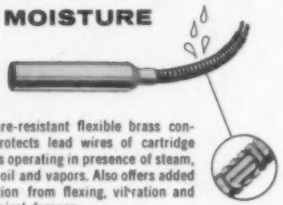
Special Chromalox features solve 3 spot heating problems

FLEXING



Spring strain reliever of high temperature stainless steel for applications in which cartridge heater leads flex. High tensile spring, mechanically locked to heater, covers lead wires a distance sufficient to distribute stress.

MOISTURE



Moisture-resistant flexible brass conduit protects lead wires of cartridge heaters operating in presence of steam, water, oil and vapors. Also offers added protection from flexing, vibration and mechanical damage.

ABRASION

Flexible brass conduit protects cartridge heater lead wires against abrasion from other moving parts and from accidental mechanical damage. Safety factor where lead wires are exposed to machine operator.

FREE BULLETIN!

CHROMALOX ELECTRIC CARTRIDGE HEATERS

Get the full story. Call your Chromalox Representative or write today for Bulletin 850.

C-2101

Edwin L. Wiegand Company

7553 Thomas Boulevard • Pittsburgh 8, Pa.

For more facts circle 518 on Reply Card

BACKTALK— FORETHOUGHTS

'Designing for Corrosion Resistance,' in the January, 1957 issue, to which reference was made, but, alas, the January issue has apparently already been discarded.

"I would be very grateful if you could send me reprints of both articles. If you could send me three or four copies of each, I could place them with people to whom they would be of real value." *Milton Press, Design Engineer, Plant Engineering Dept., Republic Aviation Corp., Farmingdale, L. I., N. Y.*

▶ We certainly would not want such a good reader to go begging for the first part of the article "Designing for Corrosion Resistance," so we have sent Mr. Press a copy of the January, 1957 issue of PLANT ENGINEERING and extra tear sheets.—*Editors.*

Fire Alarm

PLANT ENGINEERING:

"Please send us full information on radioactive alarm systems for fires. We are manufacturers of wooden bedroom furniture and our plant is equipped with a sprinkler system." *R. E. Hubbard, Johnson-Carpenter Furniture Co., Inc., Roanoke, Va.*

▶ A radioactive fire alarm system, made by Pyrene-C-O-Two, U.S. Highway No. 1, Newark, N. J., was described in an article in PLANT ENGINEERING in the July, 1955 issue. We have written to the company asking them to give Mr. Hubbard all available information.—*Editors.*

Pipe Sizing Charts For Compressed Air?

PLANT ENGINEERING:

"Regarding points on the pipe sizing charts in the February 1957 issue of PLANT ENGINEERING. Would like to know how obtained. What would be necessary to use same chart for compressed air line sizing?" *W. L. Cooper, Engineer, Martel Mills Corp., Spartanburg, S. C.*

PLANT ENGINEERING:

"Would it be possible for me to obtain a steam chart similar to the one used by William W. Gaylord in his article titled 'How Much Steam?'

"I would certainly appreciate getting one of these for my own use." *Stanley J. Obijiski, Plant Engineer, Research & Advanced Development Div., AVCO Manufacturing Corp., Lawrence, Mass.*

▶ We forwarded copies of these two letters to Mr. Gaylord and his comments are noted below:

"The steam quantities shown in the charts published in the November, 1956 issue of PLANT ENGINEERING were calculated by the 'Babcock Formula,' using the constants given in the 'Guide' published annually by the American Society of Heating, Ventilating and Air Conditioning Engineers.

"These charts cannot be used for, nor can similar charts be made for sizing compressed air piping because there is no fixed relationship between temperature and pressure in compressed air as there is in saturated steam.

"There is a different type of chart published on page 440 of Walworth Catalog 47 which is quite satisfactory for sizing compressed air piping and there is also considerable data, in tabular form, on the friction of air in pipes on page 105 to 111 inclusive in the Compressed Air Data Handbook issued by the Compressed Air Magazine and distributed by the Ingersoll-Rand Company.

"The chart is one I prepared for my own use and as I found it very useful, thought others might be interested in it. It is not now and never has been available commercially."

Parking Lots Study

PLANT ENGINEERING:

"We are interested in using reprints of the article 'Industrial Parking Lots' which appeared in PLANT ENGINEERING, December, 1956, for a class. We should like 30 copies of this article." *William T. Edgett, Registrar, Evening Div., School of Business, Northeastern University, Boston, Mass.*

PLANT ENGINEERING:

"We would like to have a copy of the article 'Industrial Parking Lots' which appears on page 108 of your December, 1956 issue of PLANT ENGINEERING magazine." *Luceen M. Beardsley, Reader Service, R. T. Collier Corp., Santa Clara, Calif.*

For Checking Air Tools

PLANT ENGINEERING:

"In your article entitled 'Bolts versus Rivets,' page 133 of January, 1957 issue of PLANT ENGINEERING, reference is made to a hydraulic calibrator used for checking torque wrenches.

"We are interested in obtaining similar equipment for use in checking our air tools and would appreciate your advising us as to the manufacturer or distributor of this equipment." *E. N. Angell, Maintenance Superintendent, Canadian Chemical Company Ltd., Edmonton, Alberta, Canada.*

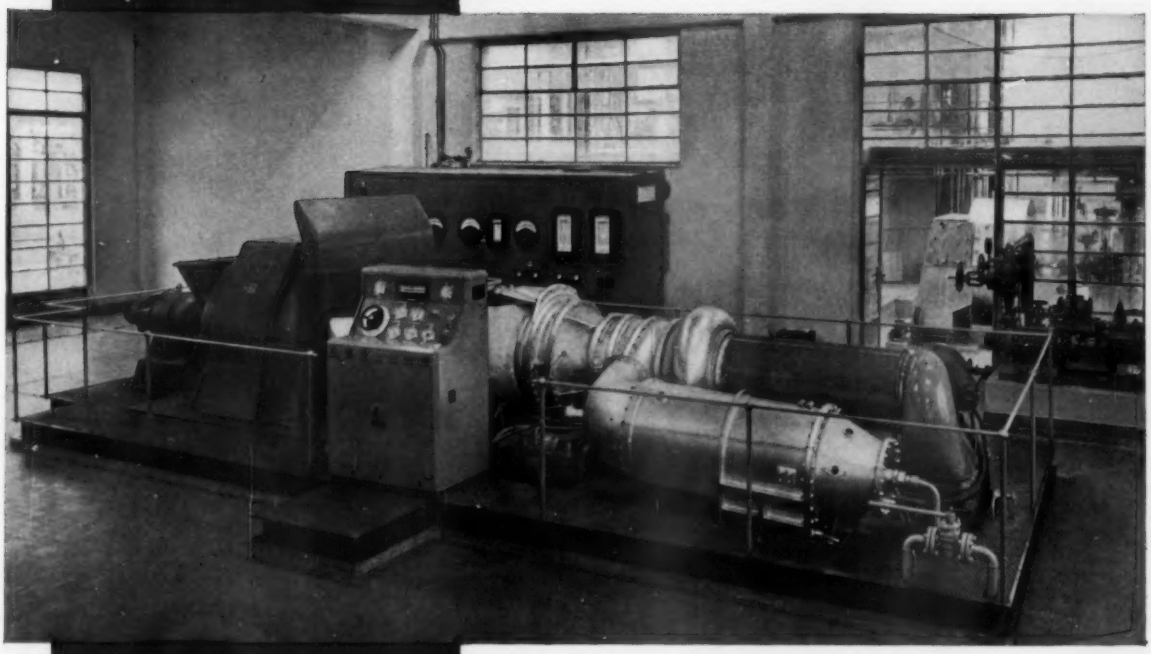
▶ For other readers who might be interested in the manufacturer of the hydraulic calibrator, the name is Skidmore-Wilhelm Mfg. Co., 442 Green Rd., Cleveland 21, Ohio. Inquiries should be sent to Mr. J. W. Wilhelm.—*Editors.*

Yes, We Still Have Them

PLANT ENGINEERING:

"We are teaching our maintenance group the theory involved in hydraulic circuits. Should you have additional reproductions of the J.I.C. Symbol Standards, we would appreciate receipt of 24 copies of this publication." *R. G. Spangler, Project Engineer, P. H. Glatfelter Co., Spring Grove, Pa.*

NOW for the first time...



The Mark TA gas turbine generating power and process steam in a refining application.

all power services in one package

In applications where multiple power services are required such as power generation, compressing, pumping, space heating, refrigeration, air conditioning, drying, or evaporating, the Clark Mark TA gas turbine is the economical choice.

Exhaust gases from this 1,150 bhp. gas turbine contain up to 10,000,000 BTU/H of recoverable energy at a temperature of 870°F. While these gases contain some products of combustion, 90% of the original oxygen content is still present.

The exhaust gases are useful where preheated air is desirable for combustion or supercharging purposes, for drying applications, catalyst regeneration, feedwater heating, evaporation of sea water, etc. These gases can also be used in air to air heat exchangers for space heating or to generate up to 9,500 pounds of low pressure steam per hour for process use. If even higher temperature gases are required, the Mark TA can be used solely as a power gas generator to provide gases of 1020°F at 20-22 psia. and a mass flow of 20 pounds per second.

For large stores, auditoriums, hotels, hospitals and office buildings, the Mark TA can provide approximately 1800 tons of air conditioning or refrigeration in the summer using the absorption cycle and also provide steam for heating in the winter. In all applications except power gas generating, this modern gas turbine also supplies 1,150 bhp. of rotative energy for pump, generator, or compressor drive.

Clark engineers stand ready to assist you in applying the Mark TA gas turbine to your application. Larger units with ratings of 9,500 bhp. are also available from Clark. Write for Bulletin No. 142.

CLARK BROS. CO., OLEAN, N.Y.
One of the Dresser Industries
Offices in Principal Cities Throughout the World

Clark Bros. Co. is licensed to manufacture the Mark TA gas turbine in this country by Ruston-Hornsby, Ltd., Lincoln, England.

CLARK

For more facts circle 519 on Reply Card

THIS RESIN COMES FIRST...

FOR TOOL HANDLES THAT LAST

EXON 654...specifically for protective dip-coating

Typical of the Pin-Pointed Properties in Exon Vinyl Resins

Tool makers have discovered that EXON 654 resin improves products three ways.

First, dip-coating all-metal tool handles into a plastisol based on EXON 654 protects the handles from active corrosion. Secondly, it helps eliminate the cold "clammy" feeling tool users find objectionable. Thirdly, it insulates the user from accidental electric shock.

This is another example of how Exon's Pin-Pointed Properties match your particular needs. Dip-coating is only one way manufacturers use this versatile resin. You can spread coat it, slush mold it or foam it.

EXON 654 is just one of the many Exon resins in industry's most complete line of versatile vinyls. It is another reason why industry looks to Firestone Exon for engineered answers to its needs.

Consider your production problem. Then, for resin properties pin-pointed to the best solution for you, check Firestone.

Firestone

EXON® RESINS

For complete information and technical service, call or write:

CHEMICAL SALES DIVISION: FIRESTONE PLASTICS COMPANY

DEPT. 715G, POTTSTOWN, PA. • A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

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INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

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don't waste steam

Nicholson steam traps have a powerful, intermittent valve action which closes the valve *completely*. Hardened stainless steel valve and seat are lapped and mated—there's no steam waste, no dribbling. And that's not all. With just one thermostatically-operated moving part, there's nothing to get out of order, nothing to go wrong. Nicholson means continuous and low-cost operation of your steam-using equipment . . . no downtime from trap failure.

- **high air-venting capacity . . . for faster warmup of equipment.**
- **small and lightweight . . . easy to pipe and support.**
- **each unit steam-tested before shipment.**

So, to get a trap that avoids waste, saves money, specify Nicholson. W. H. NICHOLSON AND COMPANY, 14 OREGON ST., WILKES-BARRE, PA. *Sales and Engineering offices in 98 principal cities.*

Write for Bulletin 1055

NICHOLSON
of Wilkes-Barre

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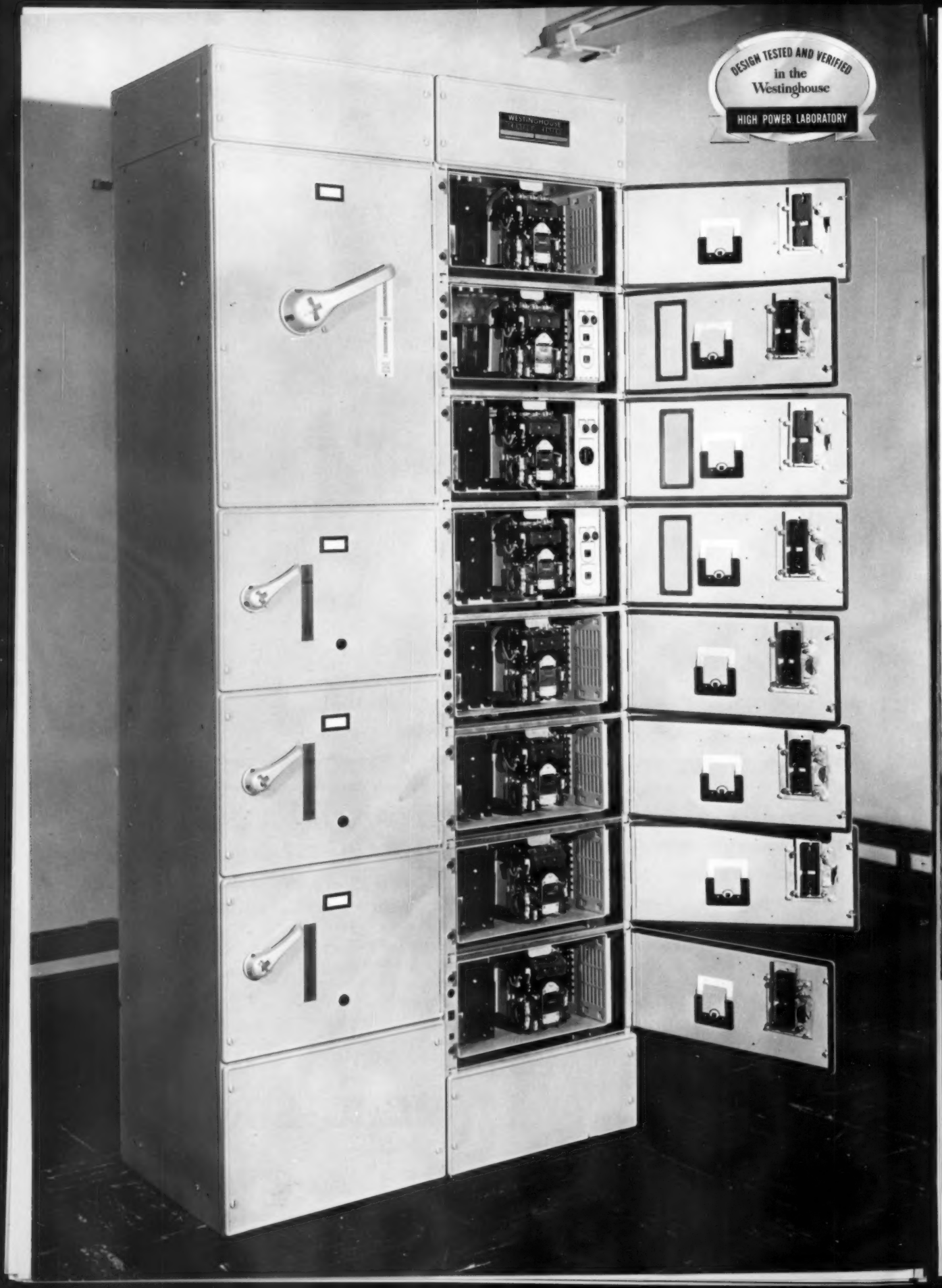
For more facts circle 522 on Reply Card


DESIGN TESTED AND VERIFIED
in the
Westinghouse
HIGH POWER LABORATORY

New Westinghouse Control Center takes both 14- and 9⅓-inch modular units

Completely interchangeable units plus new safety features mark industry's newest control center

The new Westinghouse control center is even more flexible and space-saving than ever. Not only do you get the additional versatility of the new 9⅓-inch units but complete interchangeability with the old. New safety features protect both personnel and equipment fully. And it's designed to send maintenance costs way down.

Just as important as the dividends in safety, maintenance and installation are the moneysaving advantages of dealing with one source with complete responsibility for all your control needs.

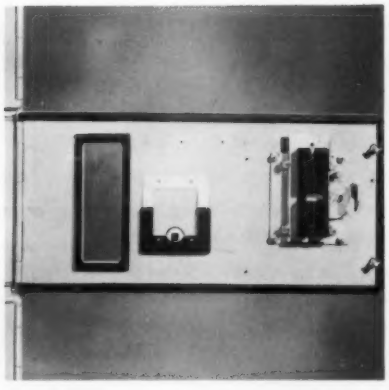
To learn more about the new standard of the industry, call your Westinghouse sales engineer. Or, write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-22042

YOU CAN BE SURE...IF IT'S

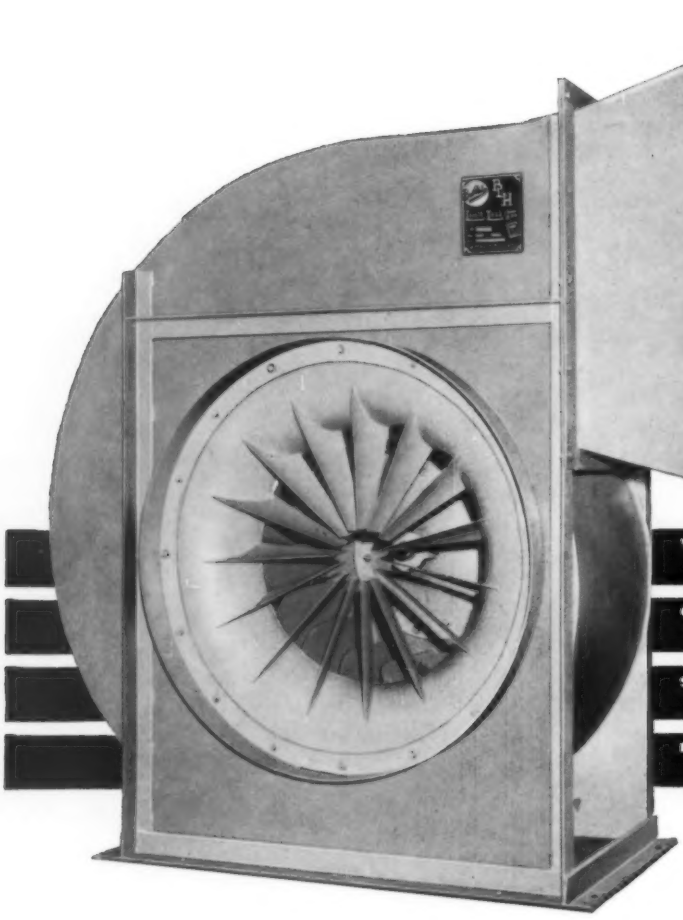
Westinghouse

New tilt-out — lock-out units pull out, disengaging stabs at back of unit from bus for safe, on-the-job servicing. Units can be padlocked in this position.

New pushbutton design for longer life—on hinged plate for ease of servicing. Gasketed cutout on door gives greater flexibility in adding or changing pushbuttons.



New door design of heavy-gauge metal with rolled edges for greater safety. Neoprene gasketing protects unit against dust and other damaging materials.



FOR

WINTER HEAT DISTRIBUTION . . . SUMMER COOLING . . .

GAS, FUME EXHAUSTING . . . ALL-YEAR VENTILATION . . .

SUPPLYING AIR WASHERS, CONDITIONING UNITS . . .

MECHANICAL DRAFT AGAINST HIGH PRESSURE . . .

SPECIFY "BUFFALO" TYPE "BLH"— THE FANS THAT ARE EASY TO LIVE WITH

- **86% mechanical efficiency**
- **For systems of 3" to 23" static pressures (for lower pressure systems, investigate the "Buffalo" Type "BL" Fan)**
- **Wheel diameters from 18¼" to 98¼"**
- **Capacities from 1000 to 500,000 cfm**
- **Complete streamlining, including divergent outlet for smooth static conversion**
- **Fixed inlet vanes for constant volume demands — variable vanes for exact volume control (no performance loss in open position)**

Yes, for your heavy industrial air moving jobs, you'll find "Buffalo" Type "BLH" Fans easy to live with! You'll appreciate their high level of efficient performance, made possible by the most complete inlet-to-outlet streamlining available in a fan. Your plant will benefit by their extremely low noise level, thanks to the low turbulence and the factory-balanced wheels. Most of all, you'll be saving money, year after year, because of the *"Q" Factor — the built-in Quality which provides* long life and freedom from troubles in every "Buffalo" *Fan.* Write for Bulletin F-200 and see the "plus" performance this fan could be delivering for you.

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

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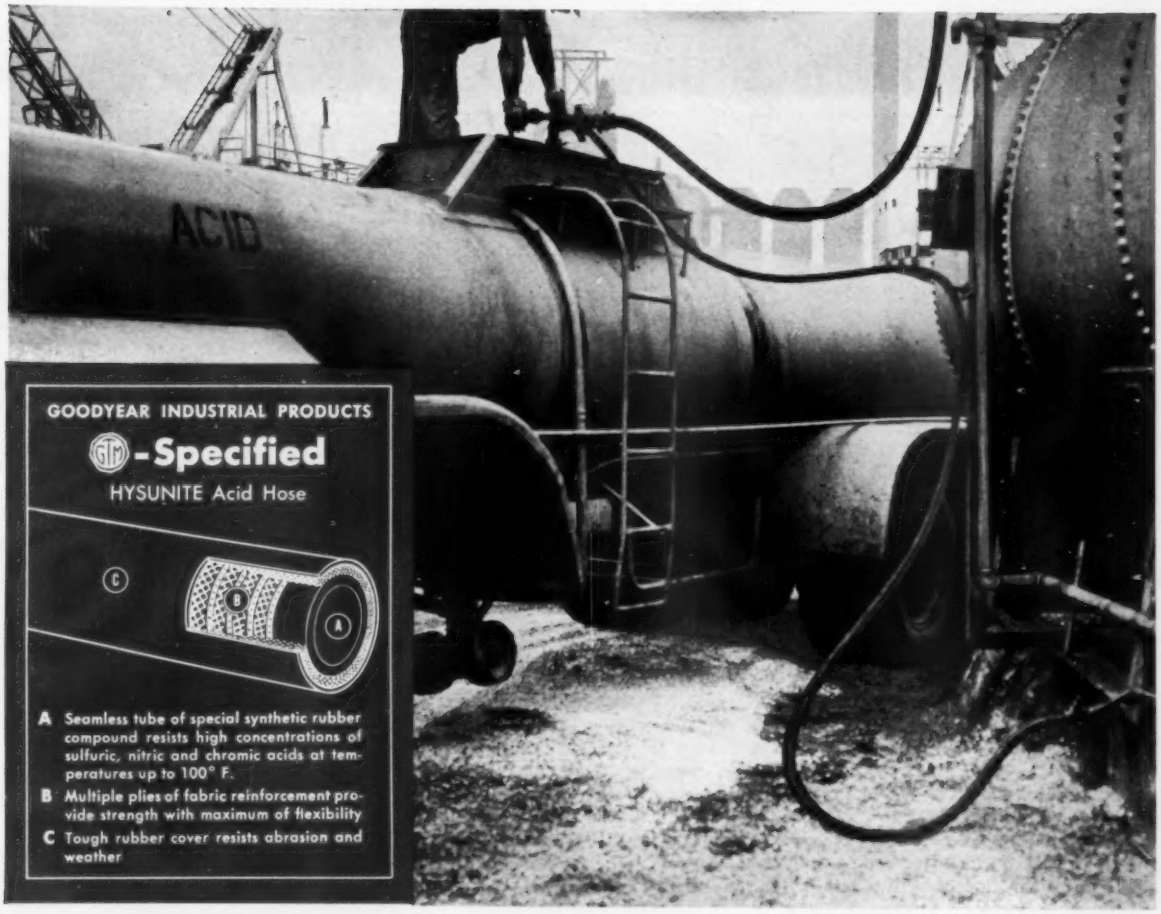
ACID
GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
HYSUNITE Acid Hose
C
B
A
A Seamless tube of special synthetic rubber compound resists high concentrations of sulfuric, nitric and chromic acids at temperatures up to 100° F.
B Multiple plies of fabric reinforcement provide strength with maximum of flexibility
C Tough rubber cover resists abrasion and weather

G.T.M. increases acid hose life by 900%

ACID—66° Baume Sulfuric—was the problem at this eastern steel mill. Many types of hose were tried for its transfer from truck to storage tank. But the best hose delivered *only 2,500,000 lbs.* of acid, before embrittling and breaking.

Then the G.T.M.—Goodyear Technical Man—recommended his new HYSUNITE Hose, specifically developed to handle highly oxidizing acids in high concentrations at temperatures up to 100° F. This rugged hose handled a fabulous *26,500,000 lbs.* of acid—was good for many more pounds – when it was removed from service for thorough checking.

If you have hose problems, it will pay you to consult your Goodyear Distributor and/or the G.T.M. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

HYSUNITE HOSE by

Hysunite—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Microanalysis of Steel

NEW RESEARCH technique that permits analysis of steel-specimen areas 10,000 times smaller than is possible by other methods, is now being developed and refined at our research center. The technique was originated in France about six years ago.

This "point probe" method of analysis employs an electron microscope which uses an electron beam to excite x-ray emission from a region a few microns in diameter. The characteristic x-rays emitted are then analyzed by a crystal spectrometer.

To make the analysis, steel samples are placed in a specimen chamber in the 4-ft electron column in the microscope and a vacuum is then created by a standard oil-diffusion pump. An optical binocular microscope and mechanical stage motion permits the operator to make a visual adjustment of the specimen under the beam.

The beam is generated by an electron gun which accelerates electrons through approximately 30,000 volts. The beam is focused by three electrical lenses. The electron-beam cross-over point formed by the objective lens is focused by the repeater lens on the surface of steel sample being analyzed.

Electron microscope is modified to allow the study of steel-specimen areas

The focused beam strikes a selected area of the specimen's surface, causing x-ray emission. The x-ray beam is then analyzed to determine its component wave lengths by reflection from a lithium-flouride crystal. Each chemical element in the sample emits an x-ray of characteristic wave length. The concentration of the element determines the intensity of that wavelength component. At present the instrument is able to detect all elements with atomic number equal to 22 (titanium) or higher.

The x-ray intensity at each wave length is measured by a geiger or proportional counter. The signal is amplified through a vacuum-tube arrangement to activate a pen on a graph. The X-axis of the graph indicates the wave length and the Y-axis charts intensity. A quantitative analysis can be made from the data. *From a release of U. S. Steel Corp., Chicago, Illinois.*

Compressors Need Fresh Air

WHEN INSTALLING air compressors, care should be taken so that the intake is placed where the air is free of both dust and vapors. While dust contaminates oil and acts as an abrasive throughout the mechanism, vapors can decrease efficiency and operating life.

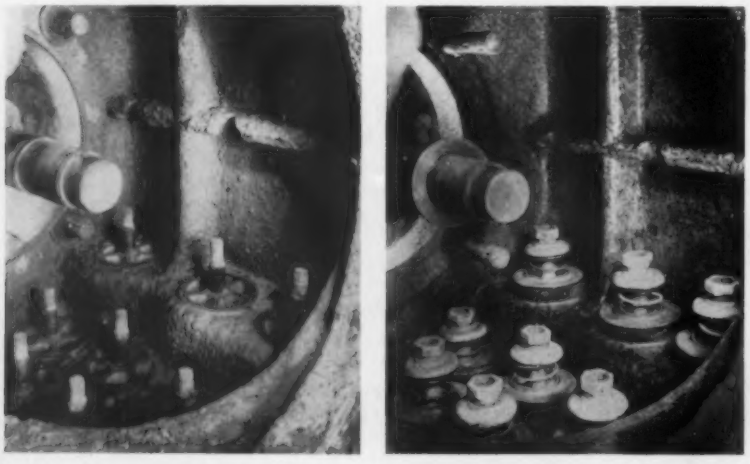
Some vapors cause lubricating oil to become gummy; others are corrosive or combustible. Relatively low concentrations of combustible vapors can be easily ignited by the heat of compression.

(Continued on page 40)

Chemical Removes Scale Safely and Quickly

REMOVING SCALE deposited by water on inner surfaces of plant equipment such as boilers, heat exchangers, condensers and evaporators can be done mechanically by scraping or blowing, which is slow and expensive, and involves considerable downtime. Dissolving scale with strong acids is quicker, more thorough and less costly, but may cause corrosion. Handling problems too, accompany the use of acids for this work.

Four years ago, Joseph Bancroft & Sons, Wilmington, Del., cleaned the cast iron jackets of air compressors in the mill with a solution of sulfamic acid and an inhibitor. A similar solution was then used for cleaning boilers, heat exchangers, condensers and caustic heaters.

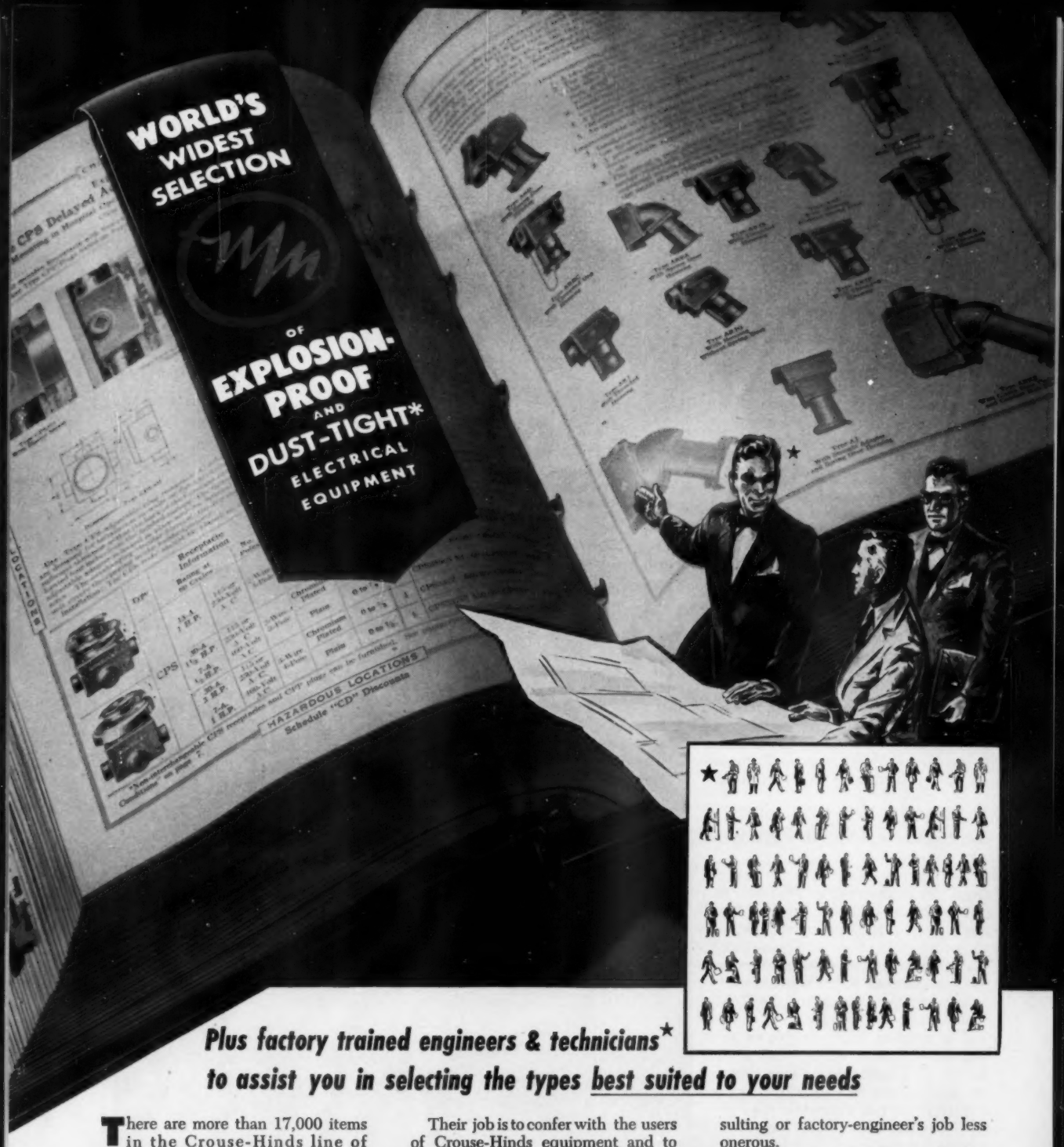


Scale (left) on inner surface of fire pump was removed by sulfamic acid (right)

Best results were achieved with a 10 to 15 per cent solution by weight at temperatures from 160 F to 175 F, allowing approximately one hour's exposure for each 1/32 in. of scale.

At the Swift & Co. Technical Products plant in Hammond, Ind., hot water heaters, glycerine evaporators and equipment used for condensing propane gas all receive periodic cleanings with sulfamic acid. A three to five per cent solution at 140 F is used, the job taking from two to eight hours depending upon the thickness of the scale.

Because the acid is shipped and handled in dry form, problem of broken carboys and spilled liquid is eliminated and the cleaning job can be done safely by regular plant workers. *From Du Pont Magazine, published by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.*



Plus factory trained engineers & technicians to assist you in selecting the types best suited to your needs*

There are more than 17,000 items in the Crouse-Hinds line of Condulet® and floodlighting equipment. Each is designed with some specific advantage or quality that makes it best suited for a particular application.

Of course, no engineer, electrician or contractor with a regular job to do, could possibly keep in mind all the pertinent data and information concerning each of these items. That's why Crouse-Hinds maintains a factory-trained field staff of 80 graduate E.E.'s and technical men.

Their job is to confer with the users of Crouse-Hinds equipment and to point out the reasons why certain Condulet equipment or floodlights are better suited for a particular job than others. With a broad grounding in the details of the National Electrical Code and a trained alertness for spotting explosion hazards in unsuspected places, they make a consulting or factory-engineer's job less onerous.

Their service is prompt and without obligation. Naturally they usually work on jobs of sufficient size to merit top-level attention, but even a small job with a large problem gets the same careful appraisal. If you'd like to talk or correspond with such a specialist, just write, wire or phone.

CROUSE-HINDS COMPANY

*Dust-ignition-proof

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For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

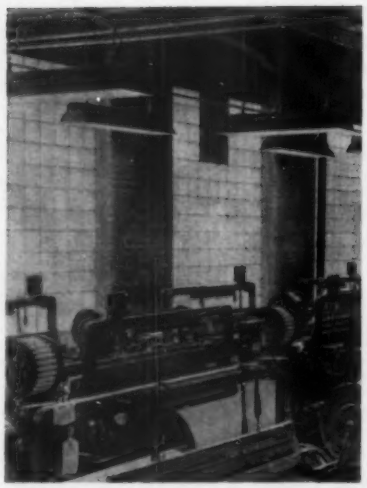
Each cubic foot of air taken in by the compressor may contain a seemingly negligible amount of vapor, but when many cubic feet of air are compressed and stored a dangerous accumulation may result.

The vapors may cool and condense in the storage tank, remaining there when the air is exhausted. Thus the percentage of explosive substance in the tank may increase rapidly until it can be easily ignited by hot carbon or heat resulting from recompression of the air should the valves leak. *From The Locomotive, published by Hartford Steam Boiler Inspection and Insurance Co., Hartford, Conn.*

Enter Glass, Exit Condensation

TROUBLESOME and damaging condensation on windows and the resulting maintenance, has been eliminated at the Poinsett textile plant of Abney Mills at Greenville, S.C., by replacing the moisture-rotted wood sash and flat glass with light-directing glass blocks.

Mortared into place to become an integral part of the mill wall, the glass blocks have an insulating value almost equivalent to that of the wall itself.



Light-directing glass blocks, replacing window sash solved the problem of excessive condensation in weave room

As a result, moisture, which had previously formed on the windows, has been practically eliminated.

Previously, condensation was so severe at times that puddles of water would form on the floor, creating a footing hazard. The excess moisture, which could not be corrected by air conditioning, would impair the operating efficiency of the machines, causing breakage of the warp or filling yarn, and raising inspection and production costs.

Installation of the glass block not only corrected these problems, but also made possible a 50 per cent reduction in boiler requirements. Formerly two boilers were required to maintain the necessary 80 F in the mill. One unit only is now operated and that only on Monday mornings following the Sunday shut down of the mill. When the desired ambient temperature is reached, the heat is shut off, heat from the machines maintaining the temperature. *From a release of Pittsburgh Corning Corp., Pittsburgh, Pa.*

Blenders for Automated Line

CHOCOLATE POWDERS, sugar and other ingredients used in products made by the Hershey Chocolate Corp., must be blended meticulously to assure consistent quality. To perform this process, three, 2000-lb capacity heavy duty blenders are used, operating an eight-hour a day schedule, with an occasional 16-hr stint.

As materials enter the drum, they are picked up by a series of revolving buckets and carried to the top of the blending chamber where they are cascaded and mixed thoroughly. In addition, the materials are forced from both ends of the drum to its center, while a swinging chute produces a lateral mixing action.

The blenders are part of an automatic system of processing. Chocolate and sugar are weighted automatically and carried by screw conveyor into the blenders. There, an air motor-

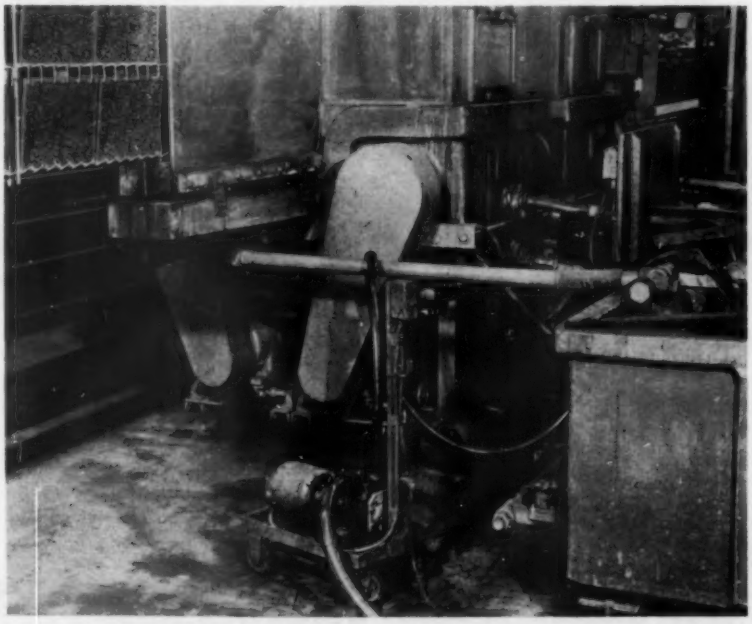
(Continued on page 42)

Maintenance Reduced in Pumping Acid for Etching Printed Circuits

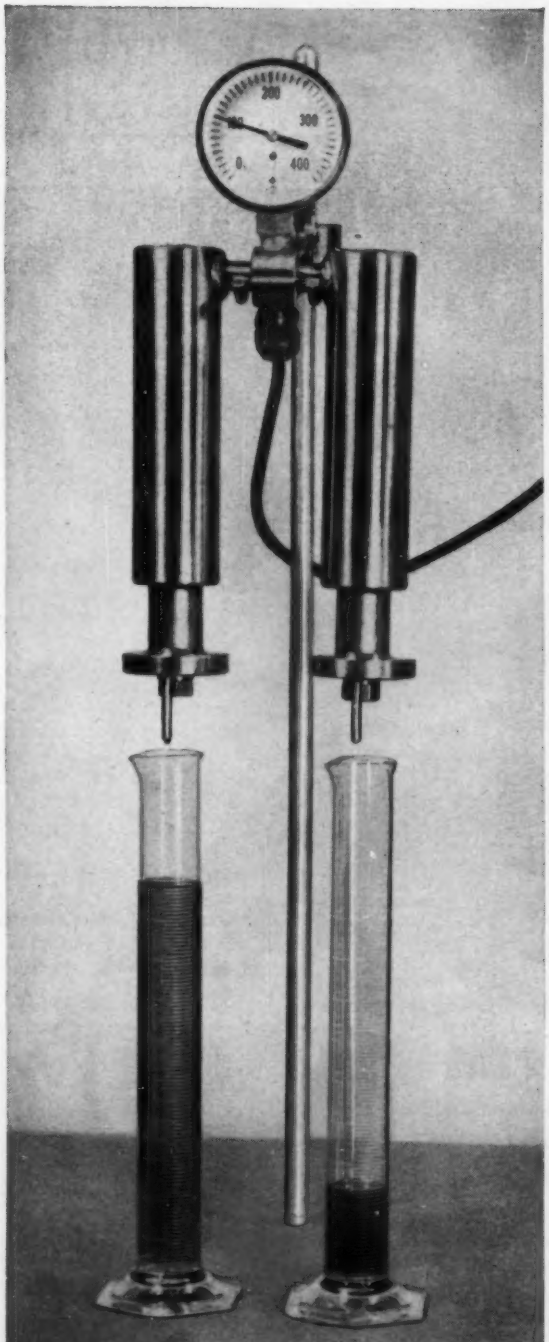
CONTINUOUS CONVEYING of concentrated ferric chloride, used in etching printed circuits, was interrupted frequently by pump breakdowns at the Metuchen, N. J. plant of Westinghouse Electric Corp. Three pumps were in use for carrying the acid from overflow reservoirs providing a supply of fresh liquor to the spraying house.

This problem was solved by installing three sealless pumps with a capacity of 5 gpm each. Two pumps are used at two etch chambers, while a third is used as a movable auxiliary for cleaning out chamber reservoirs when a batch of acid is exhausted.

The pumps have no stuffing boxes and are self priming. Fluid comes in contact only with a plastic housing and a natural rubber liner. In addition to eliminating the problem of corrosion, use of the sealless pumps, which operate continuously for 12 hours daily, has reduced maintenance to the occasional replacement of the rubber liner. *From a release of Vanton Pump & Equipment Corp., Hillside, N. J.*



Ferric chloride etch is pumped from reservoirs, right, to spray etch chambers, left



Less oil loss with Suntac is proved by this leakage demonstrator. Suntac oil is placed in one chamber, a straight mineral oil of the same viscosity in the other. Both oils are pressured through sintered bronze bearings. At 100 psi the straight mineral oil leaks out four times faster than Suntac.

LEAKAGE DEMONSTRATOR PROVES SUNTAC CAN CUT OIL LOSS AS MUCH AS 75%

Expensive equipment overhauls to stop leaks in hydraulic systems can often be avoided by a change to Suntac®. The exceptional antileak characteristics of Suntac oils can reduce oil losses as much as 75%, as can be proved in the leakage demonstrator. *Some users have reported actual drops in oil leakage of 90%.*

Suntac oils give you lower lubrication costs, cleaner equipment and floors, safer working conditions. Their leak-reducing agent leaves no gummy film or residue. In addition, Suntac oils are fortified against oxidation to lengthen oil life...against rust and corrosion to lengthen equipment life.

You'll find Suntac a money and time saver in your hydraulic systems...and a high-quality general-purpose oil for many other uses.

WANT MORE SUNTAC FACTS? Ask your Sun representative for Technical Bulletin 23. Or you can get full details, prices, and delivery information by writing to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-5.

SUNOCO

®Sun Oil Company

INDUSTRIAL PRODUCTS DEPARTMENT

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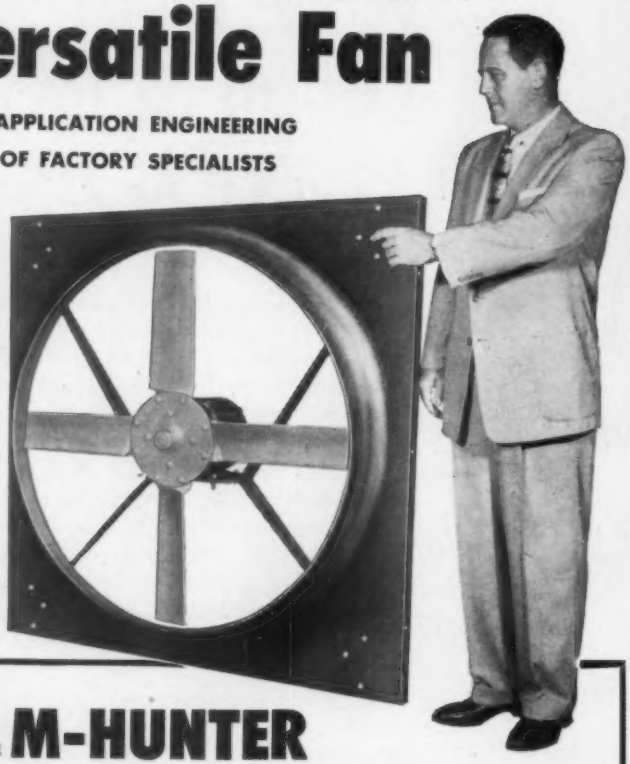
Rugged Versatile Fan

BACKED BY APPLICATION ENGINEERING ASSISTANCE OF FACTORY SPECIALISTS

5400 to 36000 CFM *(Certified)*

24" to 48" BLADES



R&M-HUNTER Direct-Drive Industrial Fan

FOR SIDEWALL · PENTHOUSE · SPOT COOLING INSTALLATIONS

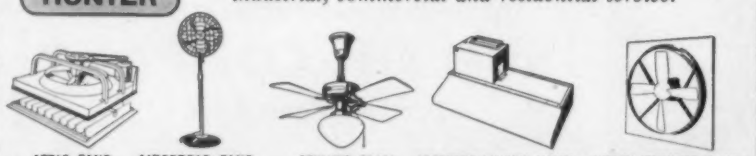
QUALITY FEATURES . . . QUALITY PERFORMANCE

- Powerful — effective up to ½" static pressure
- Streamlined air inlet 15% to 18% more efficient
- Direct drive reduces maintenance
- Square steel frame forms easily installed mounting panel
- Totally enclosed, ball-bearing motor
- Automatic shutters to fit all sizes

Write for complete data and prices

R&M HUNTER

HUNTER DIVISION-ROBBINS & MYERS, INC.
2442 Frisco Ave., Memphis 14, Tenn.
Manufacturers of a complete line of fans for industrial, commercial and residential service.



ATTIC FANS · AIRSPREAD FANS · CEILING FANS · KITCHEN RANGE HOOD · QUIET EXHAUST FANS

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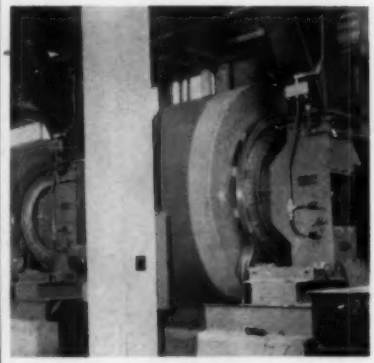
PLANT ENGINEERS' DIGEST

(Digest begins on page 38)



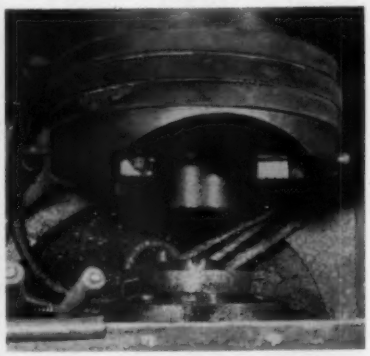
Blenders used in mixing ingredients

actuated slide determines which of the three units will take the material and, at the same time, sets the automatic timing for the operation.

Since their installation less than one year ago, the blenders have required less than one hour a week downtime per unit for cleaning and routine maintenance. *From a release of Sturtevant Mill Co., Boston, Mass.*

Die for Throw-Away Drill Bits

HOT WORK STEEL, composed of chromium, tungsten, cobalt and vanadium and known as B-47, is giving a 330 per cent increase in press forg-



Special die ring forges 10,000 drill bits

ing one-use rock drill bits at Cleveland Rock Drill Plant, Le Roi Div. of Westinghouse Air Brake Co., Cleveland, Ohio. Drill bits, used in mining, highway construction and stone quarrying, are designed to be thrown away after a period of useful life because of the expense and trouble involved in resharpening them.

The special steel is used for the die ring in the first of three presses

FOAMGLAS®

the cellular, stay-dry insulation

The moisture-proof structure of FOAMGLAS proved important in exterior corewalls of Lorillard's Greensboro plant. It permitted use of a ¼-inch space for condensation accumulation between insulation and exterior brick. Only FOAMGLAS can guarantee no loss of insulating value from moisture drainage across its surface. Architects-Engineers: Lockwood Greene Engineers, Inc., New York.

Lorillard controls cigarette-making "weather" because FOAMGLAS roof insulation stays dry!

The quality of Old Gold and Kent cigarette tobaccos depends, in part, on rigid control of the "weather" inside P. Lorillard Company's manufacturing plants. Stable temperatures of over 75°F. must be maintained with humidities in the 60% range. Inorganic, moisture-proof FOAMGLAS insulation plays an important part in that "weather" control.

Constant high humidity can ruin permeable insulations . . . completely destroy their insulating value. Expensive lost temperature control and moisture condensation problems will result. Knowing this, Lorillard engineers specified FOAMGLAS to insulate three Louisville plant roofs five years ago. The insulation provided constant, trouble-free performance on these buildings. When Lorillard's architects, Lockwood Greene Engineers, Inc., specified FOAMGLAS to insulate roof and walls of a new 13-acre plant, completed last year at Greensboro, N.C., Lorillard knew they were assured the same dependable insulating value.

Like Lorillard, leaders in every industry *and their architects* have found it pays to make FOAMGLAS top choice for dependable insulating performance . . . for industrial plants, public and commercial buildings, low temperature spaces or piping and equipment. Solve *your* insulating problems with inorganic FOAMGLAS . . . moisture-proof, strong and rigid, dimensionally stable, incombustible. Send for a free sample and directions for six simple tests to prove its benefits in your own office. Ask, too, for new building literature. Address . . .

Pittsburgh Corning Corporation
Dept. PE-57, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

Because FOAMGLAS is easily cut with ordinary tools, it was quickly and economically installed on Lorillard roofs. Its unique compressive strength of 7 tons/sq. ft. made temporary catwalks unnecessary to protect it from roof traffic during or after installation. 3" FOAMGLAS was used over tobacco handling areas, 2" over office spaces.

PITTSBURGH PC CORNING ®

Also manufacturers of PC Glass Blocks

For more facts circle 528 on Reply Card

You need Pangborn DUST Control in your plant!

Processing operations in a plant often release dust that settles on floors, walls and equipment. This dust hampers the efficiency of men and machines and makes plant housekeeping a continuing, costly burden.

Pangborn Dust Control stops that. Pangborn Collectors trap dust at the source, clean so thoroughly that in the winter many firms cut heating costs by recirculating the already-heated, cleaned air.

In addition, Pangborn gives you the bonus benefits of longer machinery life, more efficient employees, better employee and community relations and extra profits from any salvage value. Complete line of collectors for all jobs.

Discover how *you* can profit from Pangborn Dust Control—write for Bulletin 922. PANGBORN CORP., 3200 Pangborn Boulevard, Hagerstown, Maryland.

Pangborn CONTROLS DUST

For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST

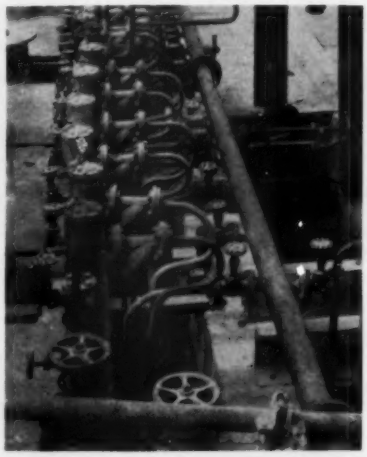
(Digest begins on page 38)

which form the drill bit from steel bar stock. Before forging, the stock is heated to 1950 F.

More than 10,000 drill bits are consistently forged by each B-47 die ring without downtime caused by die failure. Formerly, various types of die steel die rings would forge up to 7000 drill bits, but there were breakdowns due to die failure. *From a release of Allegheny Ludlum Steel Corp., Pittsburgh, Pa.*

No Fittings—Bent Pipe Instead

PIPING CARRYING steam up to 250 psi is commonly installed in England without fittings, but is bent instead. Reasons for this are: it is quicker and



Piping is bent rather than installed with fittings in many English plants

cheaper to install; fitter-welders are mostly employed, so that, where possible, pipes are bent and welded; pipes up to 2 in. diam can be conveniently cold bent on the site; and many users consider bending and welding result in a superior job to the use of fittings. *From Armstrong Trap Magazine, published by Armstrong Machine Works, Three Rivers, Mich.*

Air Uncaps Cannisters

PROBLEM OF uncapping stubborn 35mm film cannister covers has been solved by one film processor by using air power. A bench-mounted nut setter, equipped with a rubber chuck driven by a reverse rotation motor, opens 300 cannister caps hourly, including those that may be jammed.

The uncapping tool operates con-

LYON QUALITY DESIGN makes THE DIFFERENCE!

LYON benches have amazing strength and rigidity through 3 design features:
(1) All-welded construction.
(2) Legs and cross members of heavy rolled "T" shapes.
(3) Bottom-flared legs.

STEEL WORK BENCHES, for example. At a glance all work benches may look alike but there's a world of difference—in strength, rigidity, stability and smoothness of working surfaces. That's why you should check Lyon before you buy.

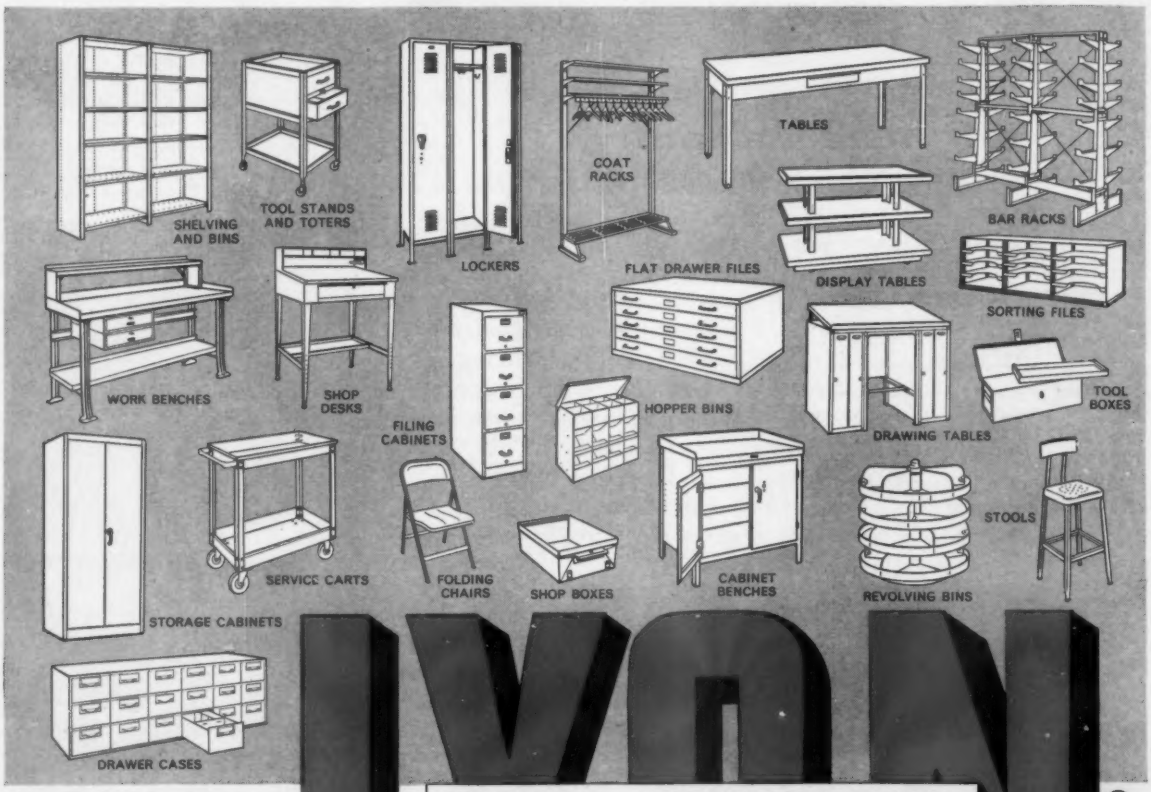
This same quality design makes the difference in every one of the more than 1500 standard Lyon items, a few of which are shown below.

CALL YOUR LYON DEALER. He offers the world's most diversified line of steel equipment. Equally important, he can show you how to get the most for your money in terms of saved time and space.

We can manufacture special items to your specifications.

LYON METAL PRODUCTS, INC.

General Offices: 591 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities



OVER 1500 ITEMS for Business, Industry, Institutions

LYON®

STEEL EQUIPMENT

For more facts circle 530 on Reply Card

They needed pumping capacity

They needed pumping pressure

You can have capacity . . . or pressure . . . or both

You can meet an exceptionally wide range of pumping needs with just two types of Goulds pumps.

For volume pumping—33 sizes of the Fig. 3405 single-stage, double-suction pump provide capacities up to 6400 GPM, heads up to 425 ft.

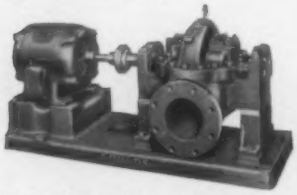
For great pressure—5 sizes of the Fig. 3305 two-stage pump provide heads up to 1000 ft., capacities to 1200 GPM.

All these *extra* features are *standard* on both groups:

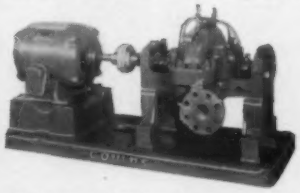
1. Bearing housings sealed against dust and moisture.
2. Renewable stuffing box bushings.
3. Die-formed stuffing box packing.
4. Cowl-type glands for use with quenching fluids.
5. Corrosion resistant gland bolts.
6. Stainless steel impeller keys.
7. Teflon water seal rings.

Because so many parts on these pumps are interchangeable—you can cut parts inventory in two or better.

For further information write for Bulletin 721.6 on the Fig. 3405; Bulletin 722.6 on the Fig. 3305.



Goulds Fig. 3405 single-stage pump.



Goulds Fig. 3305 two-stage pump.

MEMBER

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Branches: Atlanta • Boston Chicago • Houston New York • Philadelphia Pittsburgh • Tulsa

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In Canada: The A. R. Williams Machinery Co., Ltd. in all principal cities.

For more facts circle 531 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

This nut setter powers a rubber chuck to uncap 300 film cannisters per hour

tinuously. The operator positions a container cap against the rubber chuck and off comes the cap. The addition of a knee- or foot-operated valve would conserve the compressed air. *From Production and Plant Ideas, published by Keller Tool Division, Gardner-Denver Company, Grand Haven, Mich.*

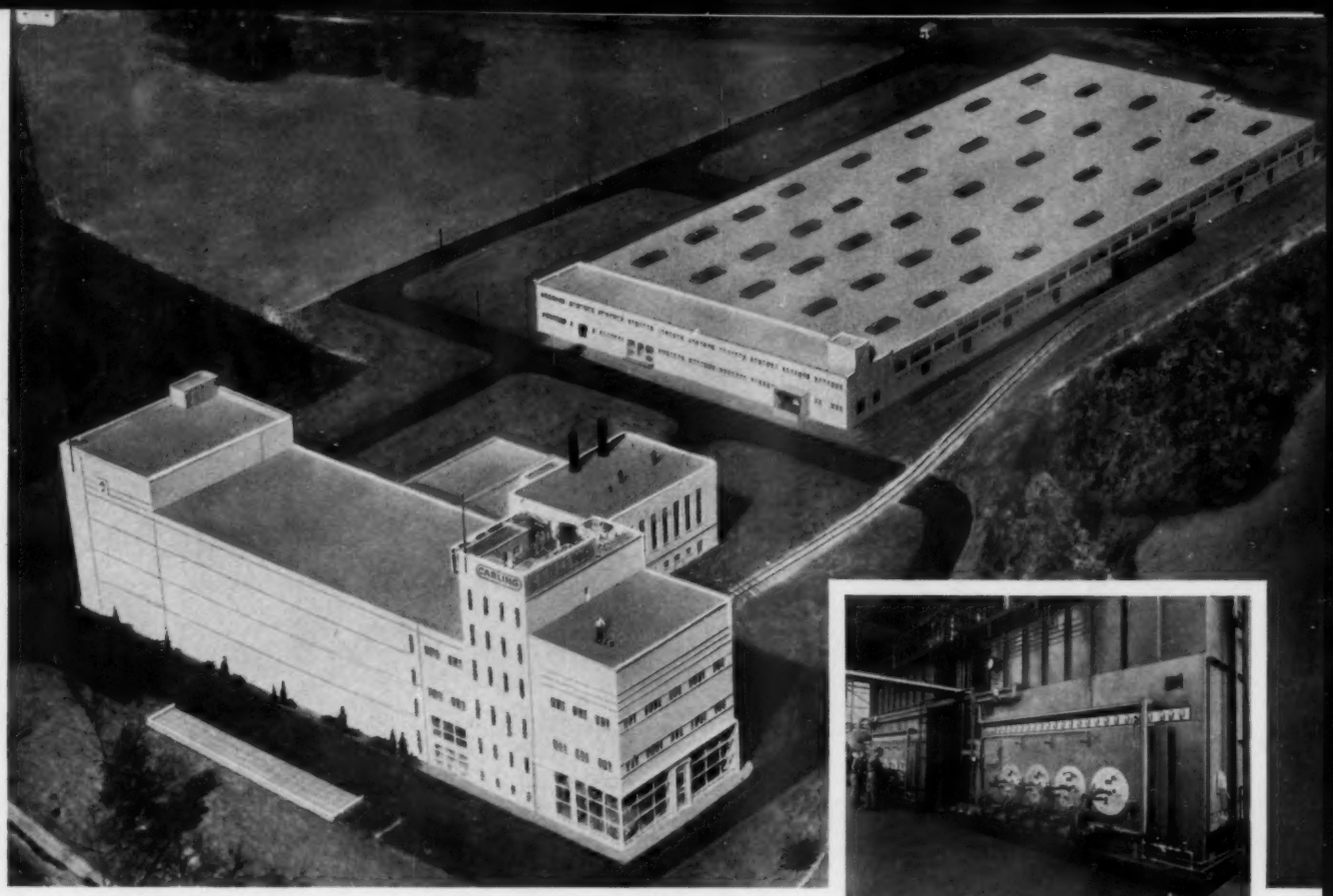
Floor Withstands Heavy Use

METAL-WHEELED hand trucks used to carry loads of green coffee weighing from 800 to 1000 lb, splintered and eventually ruptured the wood floors at the Adelphia Coffee & Tea Co.,

Heavy-duty flooring after 10 years' use (above) compared with floor it replaced

New York, N. Y. As holes wore in the floors, sheets of steel were placed over them to provide temporary protection.

Eventually the passageways became



Each B&W Integral-Furnace Boiler at Carling's Natick plant has a capacity of 58,000 lb of steam per hr at operating pressure of 150 psi and 200 psi design pressure. Plant designed by: Carling Brewing Company, Engineering Department, Cleveland. Architect: John Marshall, Canadian Breweries, Ltd., Toronto. General Contractor: Gilbane Building Co., Providence, R. I.

B&W Integral-Furnace Boilers Prove Reliability at Carling's

TWO UNITS ASSURE CRITICAL TIME CYCLING IN BREWING PROCESS

Carling Brewing Company's Natick, Mass., plant, the first new brewery in New England in more than 40 years, produces 600,000 barrels of Red Cap Ale and Black Label Beer a year. Steam for the brewing process, pasteurizing, sterilizing, and heating the plant is supplied by two B&W Integral-Furnace Boilers.

One Unit Alone is meeting the plant's maximum load of 35,000 lb of steam per hr, with the second on a stand-by basis. This boiler-room schedule is part of the plant's overall design, which will permit adding another 600,000 barrels of capacity when required.

After a Year of Operation, Lewis R. Grant, Chief Engineer, reports that the oil-fired boilers have given instantaneous response to load changes and are operating at high efficiency. There has been no maintenance necessary since the boilers went on the line.

Reliability Is Important at the Natick plant because of the exacting time cycling of the brewing process. The B&W units have easily met this test. The steam delivered has been clean and dry, with no indication of solids carry-over.

B&W Integral-Furnace Boilers, for any steam requirements up to 350,000 lb per hr and for all fuel conditions, incorporate installation, operating, and maintenance features that give greater boiler efficiency, availability, continuity of service, and overall economy. They provide maximum capacity in small space, high fuel economy, smokeless combustion, and economical, fast steaming. Completely integrated units, they are backed by the undivided responsibility of a single manufacturer, with nearly a century of steam generating experience. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

G-839-IB

BABCOCK & WILCOX

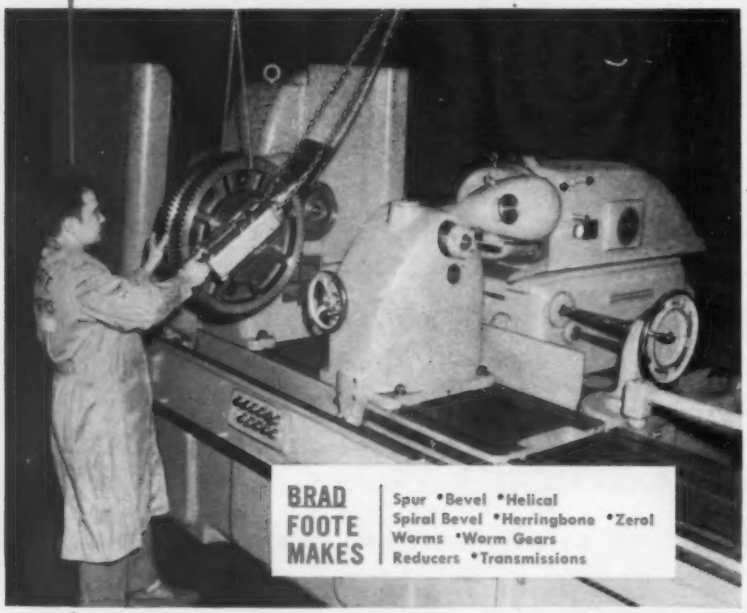
BOILER DIVISION

For more facts circle 532 on Reply Card

SPECIAL MACHINES —MEN

2 Reasons Behind Brad Foote Quality

• The craftsman shown below is loading a gear into one of the latest additions to BRAD FOOTE'S long list of special-purpose machines. The only one of its kind in existence, this new shaver can straight or crown shave gears up to 51" in diameter. Normally accommodating gears with shafts up to 142" between centers, it can handle even longer shafts by using special journals. Specially designed, the new machine will shave either internal or external gears.



• Costly special machines such as this are important in providing the extra quality at lowest cost which is the hallmark of BRAD FOOTE gears. But these are only part of the story. Even more important, perhaps, are the men who man these machines—experienced craftsmen with long experience in producing gears to meet the most exacting and specialized requirements.

• BRAD FOOTE'S facilities are at your disposal whether you need one gear or a long production run. We would sincerely appreciate an opportunity to discuss your requirements or quote on your specifications. Your inquiry will receive prompt attention.

BRAD FOOTE GEAR WORKS, INC.

1302 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • Olympic 2-7700 • TWX: CIC-2856-U

subsidiaries | AMERICAN GEAR & MFG. CO. Phone: Lemont 920 Lemont, Illinois | PITTSBURGH GEAR COMPANY Phone: SPalding 1-4600 Pittsburgh 25, Pennsylvania

For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

cluttered with sheets of steel and the wood floor was torn up. In its place a heavy-duty concrete flooring was installed. During 10 years of use, it has required no maintenance. *From a release of Walter Maguire Co., New York, N. Y.*

Bagged for Shipping

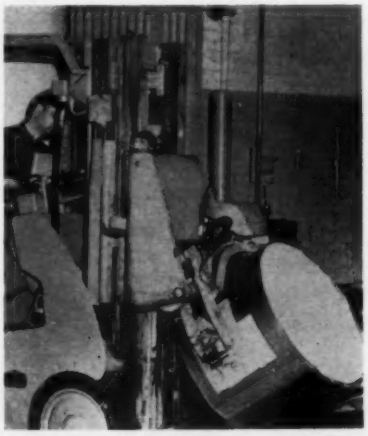
ABRASION ON the tops of steel desks, caused by packaging in kraft paper prior to shipment, has been eliminated at Haskell, Inc., Pittsburgh, Pa. by using bags of specially treated, smooth paper.

This use of the bags, instead of wrapping paper and tape, also reduced the time required for covering each desk from one minute to less than 10 seconds. The saving in time, tape and waste paper has paid for cost of using these bags. *From a release of Central States Paper and Bag Co., St. Louis, Missouri.*

Handling Paper Rolls

SPECIAL CLAMPS on an electrically driven fork truck are eliminating much manual handling in the unloading of box cars at the Uarco, Inc. plant in Chicago, Ill.

The clamps, which revolve in a for-



Special clamps easily handle paper rolls

ward direction, rather than sideways, make it possible to handle large paper rolls without tipping or rolling them. The rolls may be lifted even though the clamps are only able to grip less than 180 deg of the surface. *From a release of Automatic Transportation Co., Div. of Yale & Towne Mfg. Co., Chicago, Ill.*

ROCKWELL-BUILT

DELTA 11" metalworking lathe

"You can't beat it for precision work"

say Sam and Charles Lentini, Co-Owners, Jacy Manufacturing Co., Brooklyn, N.Y.

ACCURACY TO 0.0003 INCH. The Lentinis use their Delta 11" Lathe to machine precision instrument parts and components for the aeronautical and electronics industries where extremely close tolerances are demanded. Their Delta meets these exacting demands down to plus-minus 0.0003-inch tolerance. Sam Lentini points out that the lathe's L-00 tapered key drive chuck insures a positive grip on the work.

SHIFTS OPERATIONS QUICKLY. With their Delta 11" lathe, the shift from turning or boring to threading or tapping is done with complete ease. There's no time lost in changing set-ups. "The big, legible dials on the Delta lathe make precision machining fast and easy," explains Charles Lentini.

CONSISTENT QUALITY. Jacy men get the same high quality results in metals ranging from brass to titanium—in lots as large as 30,000 or small as 10. As Sam Lentini points out, "For doing precision work in small lots or large, you can't beat the Delta 11" metalworking lathe."

PAYS ITS OWN WAY. "In a shop like ours with a variety of work, every tool must be versatile enough to pay its way on every job," says Charles Lentini, "and *we have yet to find a precision job that our 11" Delta couldn't do.*"

SEE THE ENTIRE DELTA 11" METAL LATHE LINE. **Compare—and make up your own mind. Your Dealer is listed under "Tools" in the Yellow Pages of your phone book.**

Send coupon for all the facts!

DELTA ROCKWELL

another product by **ROCKWELL**

Delta Power Tool Division, Rockwell Manufacturing Co.
602E N. Lexington Ave., Pittsburgh 8, Pennsylvania

☐ Please send Delta Industrial Catalog on entire Delta 11" Metal Lathe Line.

☐ Please send name of my nearest Delta Dealer.

Name_____ Title_____

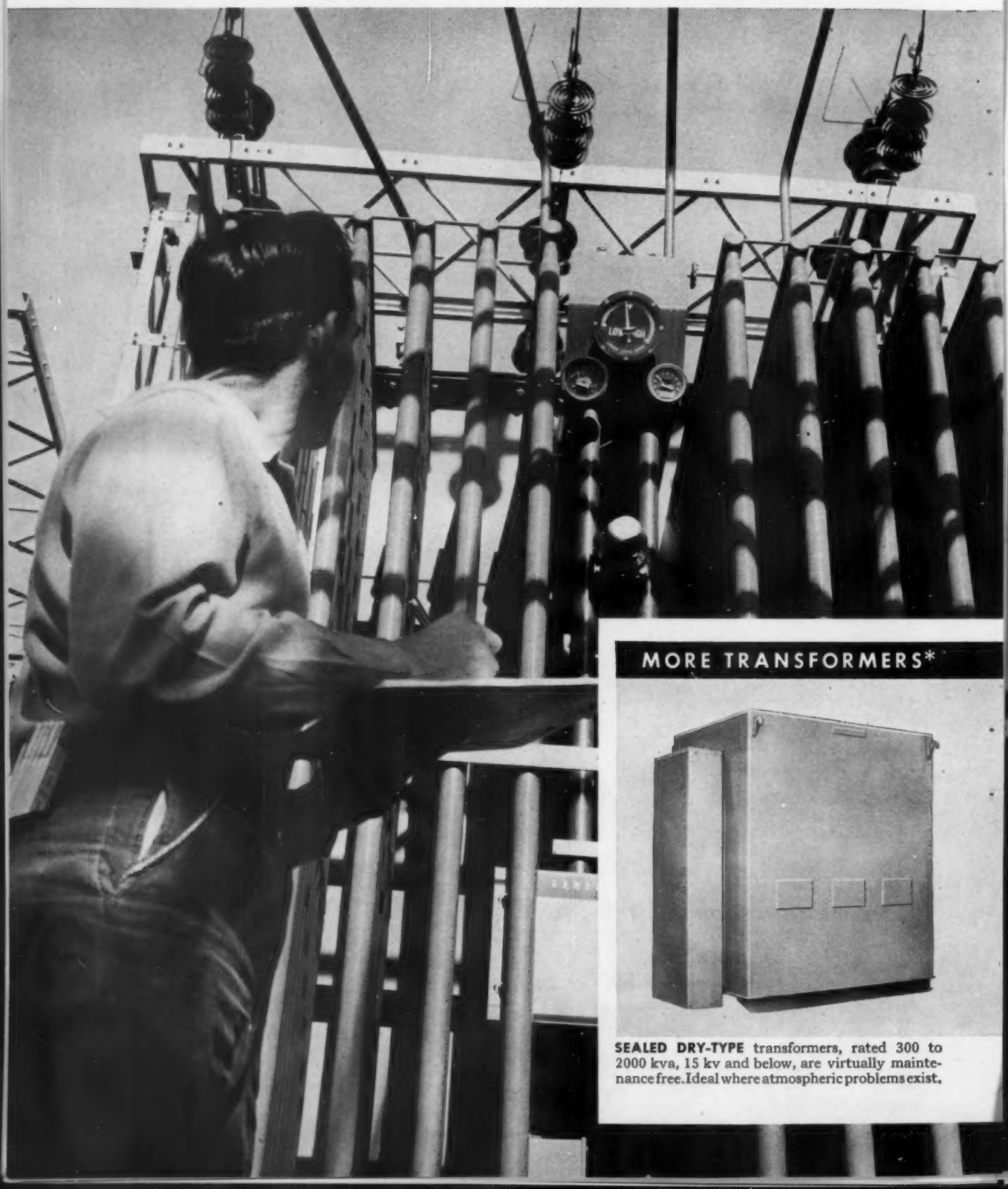
Company_____

Address_____

City_____ County_____ State_____

For more facts circle 534 on Reply Card

Reduce maintenance 20% with



MORE TRANSFORMERS*

SEALED DRY-TYPE transformers, rated 300 to 2000 kva, 15 kv and below, are virtually maintenance free. Ideal where atmospheric problems exist.

General Electric RM medium transformers

If your new or modernized plant power system calls for transformers 501 to 7500 kva, 69 kv and below, you'll benefit from reduced maintenance on General Electric RM (Repetitive Manufacture) medium transformers.

These G-E features have helped owners cut transformer maintenance time and costs 20 percent and more:

Control-center arrangement of instruments and gages makes them easier to read, easier to service.

Full drain permits sampling of oil from the very bottom of the tank, where water or sediment could collect. This allows less frequent, more complete inspections.

Super Melaglyp finish gives you up to 150% longer paint life. A spray-on can is furnished with each transformer so you can touch-up, prevent rust spots.

MORE RM MEDIUM TRANSFORMER BENEFITS:

Reduced maintenance is only one of the outstanding benefits you'll receive. Here are more:

Faster, less expensive installation—shipped completely assembled, RM medium transformers have features such as ski-tip bases, extra jacking space, and reversible junction boxes which can cut installation time to only four hours.

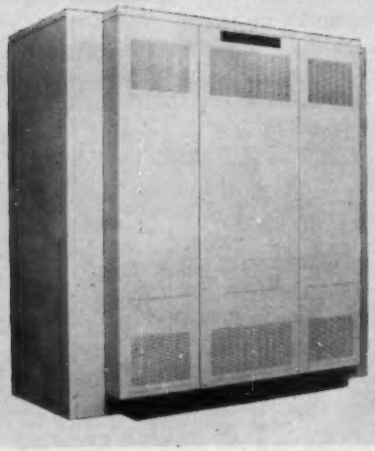
Shorter shipments—standardization of design and General Electric's repetitive manufacture process cut shipping time to 10 weeks. Voltage ratings and optional features available make these standard units ideal for most industrial applications.

Before you buy a medium transformer, contact your nearest General Electric Apparatus Sales Office. You'll discover how faster shipment, easier installation, reduced maintenance, and longer life add up to more for your transformer dollar. General Electric Company, Schenectady 5, New York. 416-14

Progress Is Our Most Important Product

GENERAL ELECTRIC

FOR INDUSTRIAL USE FROM THE COMPLETE GENERAL ELECTRIC LINE



OPEN DRY-TYPE transformers, rated 300 to 2000 kva, 15 kv and below, are used in clean, dry, indoor locations where weight or floor space present problems. Light enough to mount overhead!

LIQUID-FILLED transformers, rated 112½ to 500 kva, 15 kv and below, conveniently and economically supply small blocks of power. Outdoor units are oil-filled; indoor, Pyranol† filled.

*** These same transformers are also incorporated in General Electric's outstanding line of load-center and distribution-center unit substations.**

† Reg. Trade-mark of General Electric Company.

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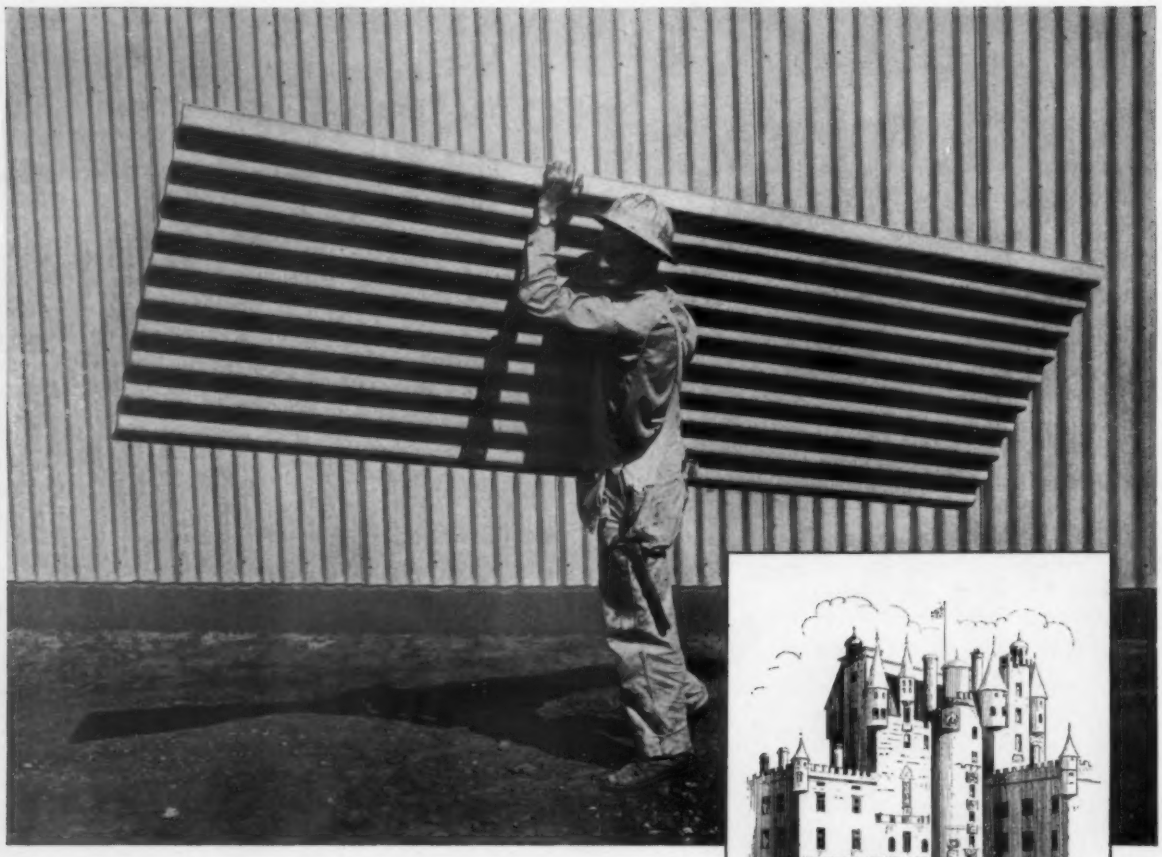

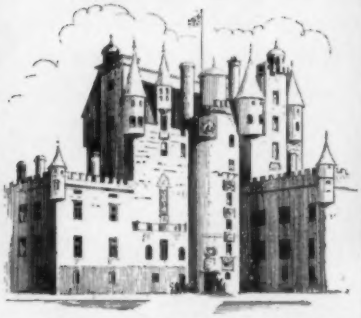

Constructed of stone in 1675-87, Glamis Castle in Scotland has withstood the ravages of weather and time. Glamis is the ancestral home of Queen Elizabeth of Great Britain.

Build years of service into roofs and walls

Johns-Manville Corrugated Asbestos Transite wears like stone

For durability, Corrugated Transite is one of the most lasting building materials ever developed. Made of two practically indestructible minerals—cement and the ageless rock, asbestos—Transite looks and wears like stone. Like the famous old stone castles, original installations of Corrugated Transite are still giving service and protection under conditions which destroy other forms of roofing and walls.

Corrugated Transite can't burn, can't rot, can't rust. It has high resistance to acids, to gaseous fumes, to severe temperatures, to vermin and insects.

You save money on maintenance. Corrugated Transite requires no painting, no preservative treatment. It provides maintenance-free construction.

Corrugated Transite offers a way to save money on new construction and remodeling. The large sheets are low in first cost . . . require no special tools for application . . . can be installed quickly and easily over skeleton frame construction . . . are 100% salvageable.

For more specific information, write Johns-Manville, Box 158, New York 16, N. Y. In Canada: 565 Lakeshore Rd. East, Port Credit, Ont.

THE AMERICAN INSTITUTE OF ARCHITECTS 1857-1957

Johns-Manville congratulates the American Institute of Architects on its 100th Anniversary.

—Consult an architect—use quality materials.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

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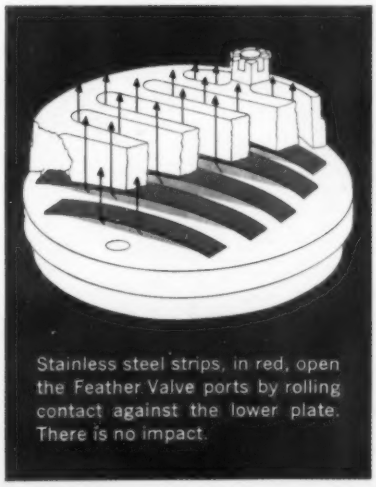
For more facts circle 537 on Reply Card

Just a puff of air lifts the valve strip...

WORLD'S "FASTEST" COMPRESSOR VALVE!



Stainless steel strips, in red, open the Feather Valve ports by rolling contact against the lower plate. There is no impact.

It's not magic, merely a demonstration of Worthington's amazing Feather* Valve—the lightest, fastest-acting compressor valve on the market. Less than half a pound of air pressure will operate the valve in a standard two-stage 100 psi Worthington machine.

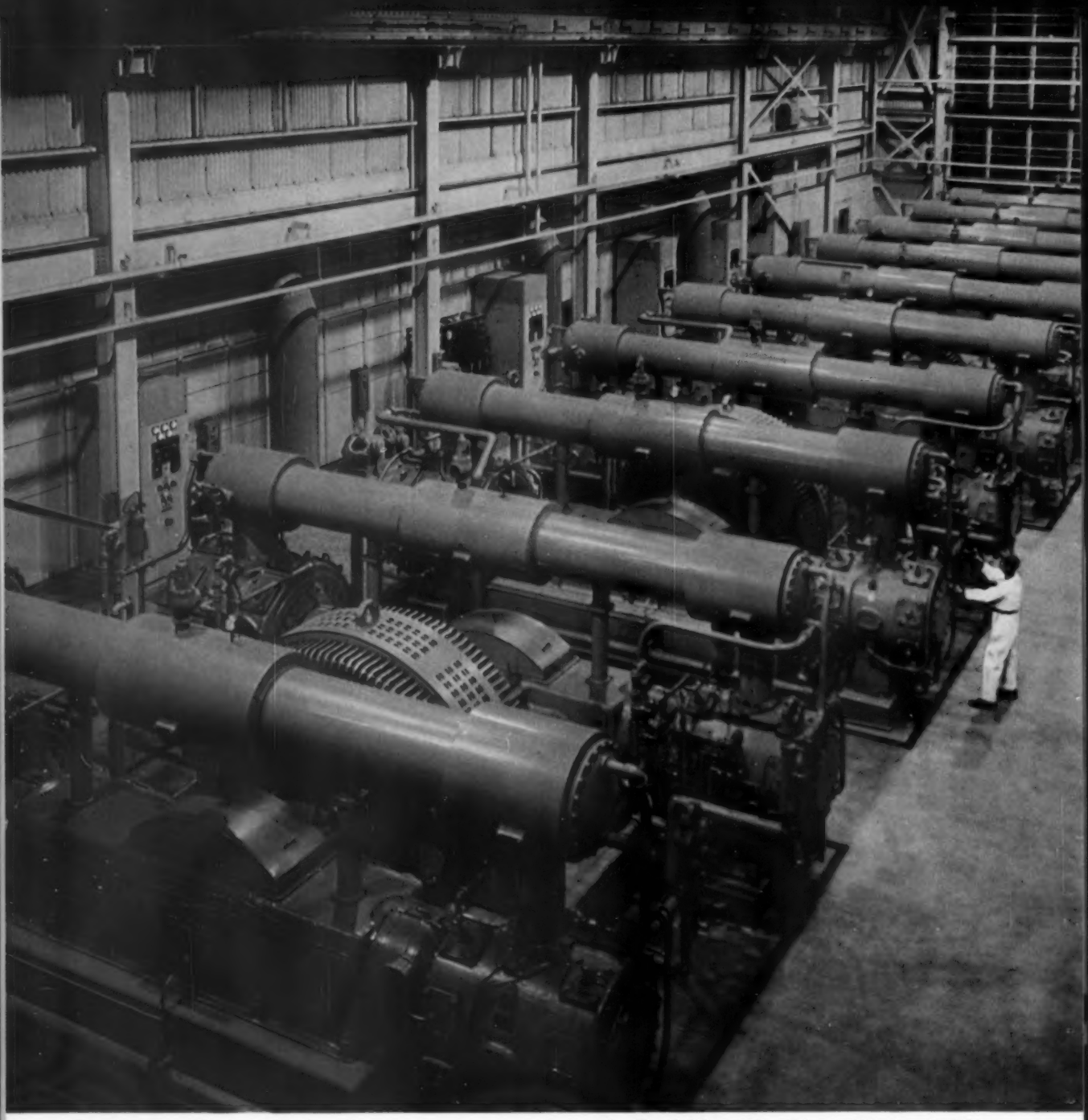
Because of its lightness and flexibility, Feather Valve action is very sharp. There is virtually no slip or back flow. Result: real savings in power costs.

No Impact. Even when operating as fast as forty times a second, the Feather Valve works with no impact. Lack of impact plus the absence of buffer plates and cushioning accessories assure long life and negligible valve maintenance.

For an on-the-spot report of a Worthington "Feather Valve" water-cooled compressor in action, see the next page.

WORTHINGTON

*Reg. U. S. Pat. Off.



Worthington Feather Valve air compressors operating at the Ford Motor Co. Plant, Cleveland, Ohio.*

HOW TO GET THE PLANT AIR COMPRESSOR YOU NEED

As in the above Ford plant, compressed air is a basic power service in most every modern industrial plant. Equipment reliability and long life are a must.

Worthington makes a complete line of water-cooled air compressors. Every machine is available in a standard unit, from the single horizontal "midgets" to the big balanced opposed "giants." This standardization allows complete freedom of choice and you can install these high quality machines at lowest possible cost in a surprisingly short time.

For more information about your compressed air needs, write Section K-71, Worthington Corporation, Harrison, New Jersey. In Canada: Worthington (Canada) 1955, Ltd., Toronto, Ont.

WORTHINGTON

See preceding page

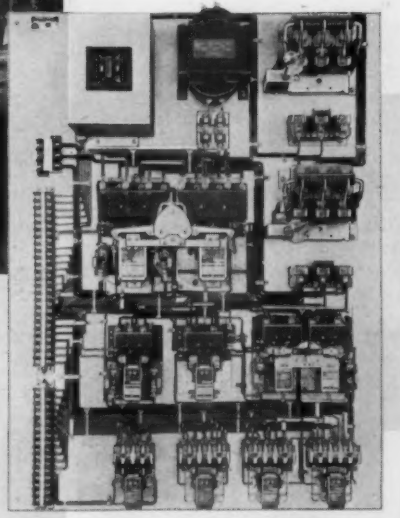
SQUARE D PRESS CONTROL

Built the Way You Want It!

Square D control is used by virtually every stamping press manufacturer in the country—and is approved by the three largest automobile manufacturers.

What's behind this preference for Square D? Biggest reason, we believe, is *completeness* of line which enables us to *custom build* to individual requirements, using *standard* control components. Actually, that has a bearing on a lot of things—including delivery, safety, uninterrupted production, maintenance parts standardization, plus field engineering service.

On the next press you buy, specify **SQUARE D CONTROL.**



above • **typical Square D press control panel, designed and built to customer specifications, using standard components**

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY

For more facts circle 538 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by Vernon T. Kempf

No-Stick, No-Burn Soldering Jigs

Key factor in assuring accuracy while silver soldering instrument key assemblies in the Elkhart, Ind., plant of H. & A. Selmer Inc., is the resistance of cemented carbide to wear and deterioration at temperatures involved.

Besides resisting excessive oxidation in soldering operations, the use of carbide as jig elements saves hours of hand filing and other cleaning procedures. Once cemented carbide is coated with a thin tight layer of oxide, the silver solder and key components do not stick to the carbide at soldering temperatures of 1500 to 1600 F.

Hundreds of different sets of jigs are used for locating and holding the parts. Depending on the assembly involved, jigs are designed to handle as many as seven shapes in position for soldering. On most jigs, the elements consist of a visual guide bar and positioning and holding pins. The pins, in some cases, are fixed for positioning and, in others, are located on the ends of rods which can be adjusted to position and hold the instrument parts.

A typical soldering operation involves a jig for assembling five different key components—a small piece of wrought tubing, two nickel-silver castings, a pad cup of sheet metal and an adjusting lug.

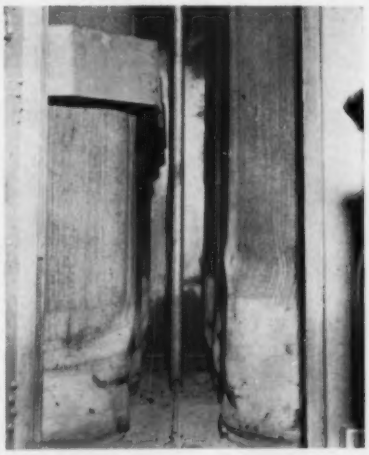
In the soldering operation, the tube is positioned between the two end pins of the jig acting as a bearing for the key. The visual guide in the jig helps the operator keep the various parts in correct alignment, while the adjustable pins enable her to position and hold the parts while applying the torch and soldering wire.

Prior to the use of carbides, soldering conditions were far from ideal. In many instances, the keys were being soldered to the jigs. Every time that happened, filing would be necessary, which meant some of the key components, as well as important elements of the jigs, would be filed away.

Application of a Carboloy cemented carbide, supplied by General Electric's Metallurgical Products Dept., has greatly simplified soldering operations. Filing no longer is an operator chore and the jigs remain intact to provide the accuracies needed in assembling the instrument key components.

400 Per Cent Cost Advantage Using Synthetic Collector Bags

SYNTHETIC FELT BAGS of Dacron polyester fiber and Orlon acrylic fiber have been used for more than a year at the experimental taconite concentration plant owned by the Oliver Iron Mining Div. of U. S. Steel Corp. at Mt. Iron, Minn. Approximately two million tons of 30 per cent iron-bearing taconite rock is mined annually in Oliver's open-pit mine. The crusher and grinding mills used to reduce the raw taconite to the consistency of cake flour creates huge amounts of dust.



Interior view of dust collector. Capacity of unit is 1000 lb of dust per hour

Twelve supported-type felt bags of the Du Pont Company's man-made Orlon acrylic fibers were installed in a Hersey-type high draft ratio, reverse

(Continued on page 58)

Microswitches Assure 90-Degree Drilling Position, Accurate Depth Control

THREE MICROSWITCHES provided the answer to the problem of keeping the drill exactly perpendicular to the work on a countersinking operation performed on wing skins at Glenn L. Martin. The self-aligning feature consists of a gimbal attached to a standard Airfeedrill. It is composed of a metal ring approximately six inches in diameter and drill holder. Three microswitches are located 120 degrees apart on the nose of the drill holder. These microswitches control a solenoid that starts and stops the air drill.

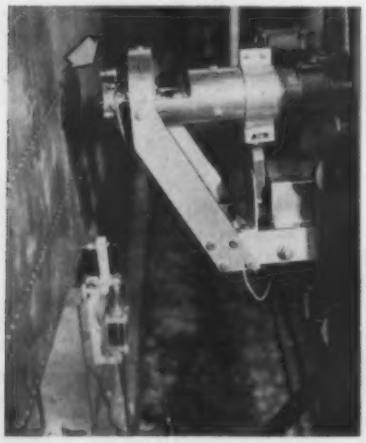


Fig. 1. Three switches (arrow) mounted 120 degrees apart on nose of drill holder

Fig. 2. Switches sense angular relation of drill to work, control depth of hole

As the drill approaches the work, the switches close, starting the drill. If one switch loses contact because of a deviation of the drill from the exact 90 degree angle, the switch opens and stops the drill.

The unit is supported by arms from a base. A magnet for locking the drill in position and an air cylinder for pressing the unit against the work are contained in the base. The rigging for the drill contains two vertical tracks on which the entire assembly rides, counterbalanced by weights. The rigging is hung on a track, to permit horizontal movement.

To provide precise depth control, a pressure pad on the countersink tooling forces the unit away from the work, thus opening the microswitches.

QUICK! *"Call the Deluxe Dealer— we have a shelving problem!"*

This poor fellow hasn't a place for everything and everything in its place. Matter of fact, there seems to be a place for nothing. Your shelving problems can't possibly be this preposterous, but if you want to talk about them with an expert call your Deluxe Steel Shelving dealer. He's nearby, ready to give you on-the-spot shelving layout service. He will engineer efficient, flexible shelving installations and supply you with additional shelving racks as fast as you need them. Deluxe dealers are backed by the finest designed and sturdiest built shelving.

These Deluxe features allow you to install Deluxe shelving at lowest cost.

1. One-piece bin type uprights—for greater rigidity, faster erection.
2. Boltless adjustable shelf brackets—complete adjustability without tools.
3. Snap-in dividers—for quick flexibility.
4. Factory-embedded shelf reinforcing—to cut down installation time
5. Coped shelf corners increase storage capacity.

DELUXE
STEEL SHELVING

DELUXE METAL FURNITURE COMPANY · WARREN, PA.

A Division of the Royal Metal Manufacturing Company

Look for your Deluxe dealer under *Shelving* in the yellow pages of your telephone directory or write to the factory for the name of the dealer nearest you and the colorful "Shelving Reference Manual."

For more facts circle 539 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

jet unit. Each bag is 13 ft high and 18 in. wide and filters 1.73 lb of dust per hour from 810 cu ft of air for each square foot of area.

These bags have operated continuously since 1955. Thus far, they have out-performed conventional bags, giving a cost performance advantage of more than four to one. Important properties that have made this possible are abrasion resistance and dimensional stability in the presence of moisture.

Sandblast Barrel Has 12 Lives

SANDBLAST BARRELS lined with plastisol have increased in life expectancy from three months to more than three years at the Underwood Corporation's Hartford, Conn., plant. The barrel revolves around a sandblast nozzle as the sand finishes small typewriter parts. Previously unlined barrels wore quickly under the blast and cost about $35.00 each to replace.

To reduce the replacement costs and the resultant downtime, Underwood had all barrels spray-coated with Unichrome 5300, a plastisol made by Metal & Thermit Corporation. This coating is a 100 per cent solids polyvinyl chloride composition which is abrasive and chemically resistant. Underwood also uses a similar coating for its racks and tanks in the plating department.

Plastisol lined sandblast barrel tumbles typewriter parts in finishing operation

The plastisol lined barrels have stood up in constant use under the sandblast for three years. Since a barrel can be relined, it need not be replaced even after the lining wears out. Cost of the plastisol lining was about $58.00 for each barrel.

Plastic Glazing for Mill Offices

WHERE VIBRATION, shock and flying metal chips caused frequent window breakage at Phoenix Iron & Steel Co., Phoenixville, Pa., Plexiglas glazing in the high-breakage areas offered a practical remedy.

Vulnerable points in the Phoenix plants were three supervisory mill offices, two of which are located in the seamless pipe mill, the third in the steel fabrication shop. The pipe mill offices measure about 12 by 22 ft, and are enclosed on all four sides by windows measuring about 40 by 48 in. each. In the third office, an unusually large expanse of window area extends from floor to ceiling around three sides of the structure.

These large window areas, while providing the advantage of excellent visibility to the shops, were highly susceptible to breakage. Continuous vibration from heavy machinery, riveting, flying chips from castings and occasional carelessness in slamming doors or jolting windows all contributed to the hazard. Breakage rate at such locations usually runs as high as six or seven panes of glass per month resulting in high replacement costs.

Acrylic plastic glazing — Plexiglas, manufactured by Rohm & Haas Co. was installed in the three offices. The first installation was made about three years ago, and to date, no breakage has occurred.

In addition to improving safety conditions for shop and office personnel, and virtually eliminating window replacement costs, the plastic glazing provides Phoenix with a third advantage: the lower thermal conductivity of the plastic panes results in less heat transmission through the windows. Since the windows occupy nearly ¾ of the total wall area in the offices, air

(Continued on page 60)

Portable Electric Heating Plants Roll to Work Areas for Spot Heating Repair Jobs

Portable heating plant warms area around maintenance man repairing tank lining

ELECTRIC HEATING has solved a problem in a northern New York plant—how to make areas in unheated buildings comfortable enough for maintenance crews to work. Sixteen portable "heating plants" are in use in the plant.

Each heating plant consists of Chromalox fan-type electric heater and its controls, mounted on four-caster dolly. Components on each dolly include the heater, rated at 460 v, a magnetic contactor, a stepdown transformer to provide 115 v for the air heater motor and a magnetic contactor holding coil.

The heater built by Edwin L. Wiegand Co., is controlled by an on-off switch, and its 20-ft cable permits ready movement around a particular area.

Management reports these portable electric heating units have boosted the morale of the maintenance crews and resulted in substantial increases in productivity.

Rolling Steel Doors

Manually, Mechanically or Electrically Operated

MAHON CHAIN-GEAR OPERATOR

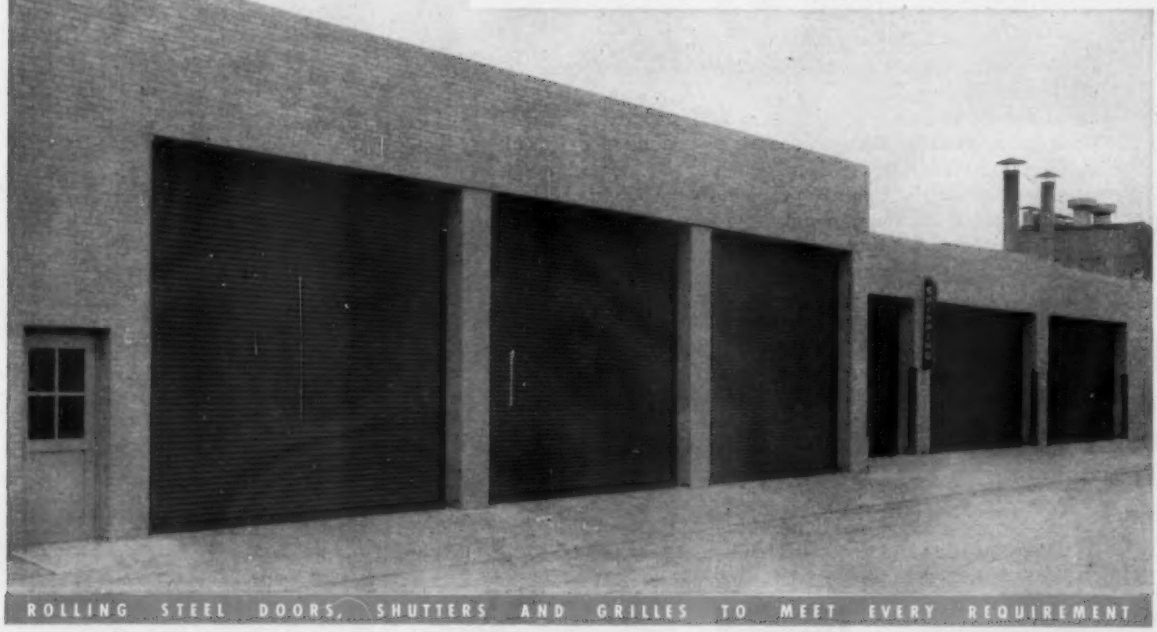
MAHON STANDARD POWER OPERATOR 920-P

When you want positive protection, permanence, low maintenance, and the ultimate in convenience and operating efficiency, you will select Rolling Steel Doors. Because, in truck and railroad openings in industrial and commercial buildings, and in loading dock and transfer dock openings, rolling steel doors offer definite timesaving and space saving advantages over any other type of door. The vertical roll-up action of the door utilizes no usable space either inside or outside the opening . . . and, there are no overhead tracks or other obstructions to interfere with crane handling or restrict headroom adjacent to the opening. No other type of door can give you the positive security, firesafety, and everyday operating convenience of a good, quick-opening, quick-closing, power operated rolling steel door. Permanent, all-metal construction reduces maintenance to a negligible factor, and assures a lifetime of continuous trouble-free service. When you buy a rolling steel door, it will pay you to check specifications carefully . . . you'll find that Mahon doors are built better to give you better service over a longer period of time—for instance, the galvanized steel in Mahon curtain slats is BONDERIZED and DIP-COATED with Synthetic Enamel which is baked on at 350° F. prior to roll-forming. This is just one of the extra-value features of Mahon Rolling Steel Doors . . . comparison will disclose many others that add up to a greater over-all value, and, a better investment. See Sweet's Files for complete information, or write for Catalogue G-57.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Fire Walls; Insulated Metal Curtain Walls; Electrified M-Floors; Acoustical and Troffer Forms; and Steel Roof Decks and Long Span M-Decks.



ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Six 18' x 14' Mahon Power Operated Rolling Steel Doors installed in openings of an Enclosed Loading Dock in the Peninsular Metal Products Corporation's Plant, Ferndale, Michigan. Lawrence G. Markey, Inc., General Contractors.

MAHON

For more facts circle 540 on Reply Card

A dangerous place to work...

that's why you see so many symbols of safety

Here's a plant that's out to keep "employee downtime" at a minimum. Extinguishers and gas masks provide protection against fire and toxic fumes. Guard rails and chains surround permanent hazards. Raised steel strips around floor openings prevent objects rolling or being kicked to the floor below. Clean windows and bright lighting provide good visibility. It's only natural that a company so interested in safety should select Blaw-Knox Steel Grating for "underfoot" safety.

Each section of Blaw-Knox Electroforged® Steel Grating is of rigid, one-piece construction, with a choice of cross bar and bearing bar surface designs and spacings that afford maximum safety under all working conditions. Indoors or out, you get safe, quiet, long lasting and self-cleaning flooring with maximum passage of light and air.

Blaw-Knox Electroforged Steel Grating is fabricated in a wide selection of materials to exact customer specifications. Fits easily and neatly into even the most congested areas.

Send for new Blaw-Knox Grating Catalog 2527
See new ideas in flooring, walkways, stair treads, platforms, shelving. Write today.

BLAW-KNOX

BLAW-KNOX COMPANY
Blaw-Knox Equipment Division, Dept. H, Pittsburgh 38, Pa.
For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

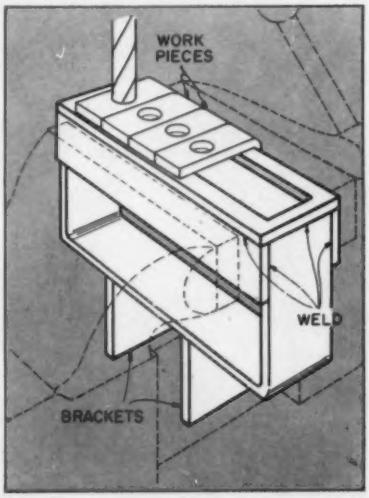
(O and P begins on page 56)

conditioning costs are substantially reduced in summer, when air temperatures above some of the work areas may exceed 100 F.

Maintenance personnel installed the glazing in the offices, using methods similar to those used for glass. The panes were cut slightly undersize to allow them to expand freely at the high air temperatures.

Jig Fits Bench Vise

POSITIONING and holding multiple workpieces for drilling and tapping is accomplished in a jig suggested by Harry Postles of the Philadelphia Naval Shipyard. The jig holds the pieces level and maintains their relative positions during drilling and tapping operations.



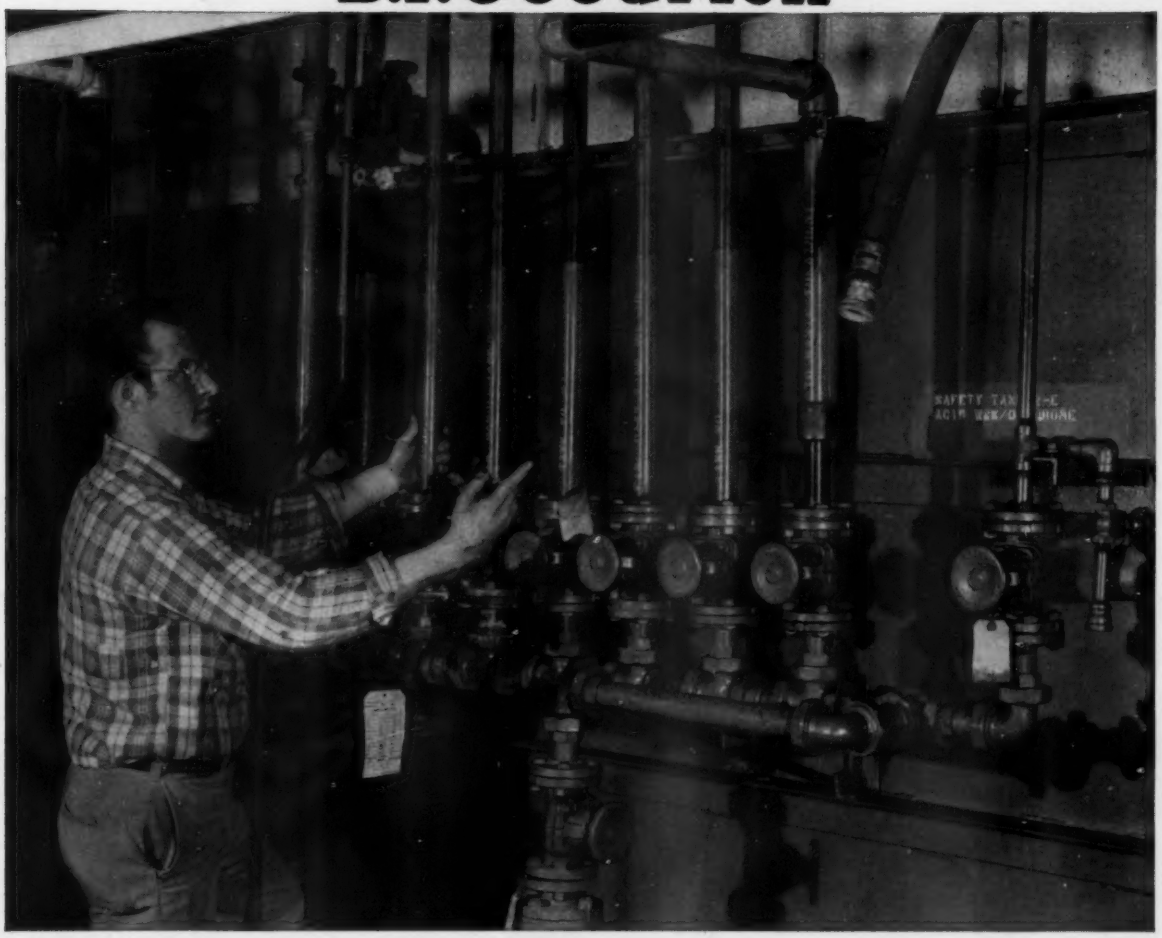
Positioned in vise, jig keeps workpieces aligned for drilling and tapping

Consisting basically of a welded box, the jig fits over the vise slide and is positioned between the vise jaws for clamping. Its hollow center permits the drills and taps to penetrate the workpieces.

Food Belt Reduces Maintenance

A CONVEYOR BELT has virtually eliminated spillage and cleaning problems in the handling of cut beans and peas at Owen Canning Corporation, Owen, Wisc. Two years ago Owen installed this tan Koroseal food handling conveyor belt made by B. F. Goodrich Industrial Products Company. There is no mildew problem even though the belt is subject to water and vegetable

B.F.Goodrich



Koroseal irons out cost and corrosion wrinkles in a washer plant

CARRYING various kinds of strong acids used in electroplating processes is the job of these rigid polyvinyl chloride pipes at the Maytag Company, Newton, Iowa. Should these pipes fail, the entire plating operation in this washer and drier plant would stop.

After using other types of pipe for carrying acids, brine mixtures and caustics Maytag decided to try Koroseal. Here's what they found: Less costly to begin with, Koroseal further reduced expense because it was easier to handle and install. Maintenance costs have been cut and the combined features of corrosion resistance coupled with Koroseal's unusually long-wearing characteristics assure them continuous trouble-free operation.

Versatile Koroseal rigid pipe has answered countless problems for many progressive manufacturers. Exceptionally easy to install, it can be threaded, cut, welded or drilled. It has excellent insulation properties, will not support combustion, and never needs painting.

Koroseal PVC is unaffected by most alkalies and acids. It is completely inert in the presence of oil, alcohol, and salt solutions. Unusually strong, it has high impact resistance and is available in tubes, rods, valves and sheets.

For information on how Koroseal can make your operations more efficient, more profitable, fill in and mail the coupon to your right. *B.F.Goodrich Industrial Products Company, Marietta, Ohio.*

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B.F.Goodrich

INDUSTRIAL PRODUCTS CO.

B.F.Goodrich Industrial Products Co.
Dept. PE-5
Marietta, Ohio

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PARTLOW TEMPERATURE CONTROLS are built to withstand rough usage, but they're also extremely sensitive to slightest temperature changes. They'll take a lot of punishment without upsetting their accuracy and precision.

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They're less complicated than thermocouples. Thick-walled capillaries and seamless tubing assure almost indefinite life. Elements can be replaced on the spot.

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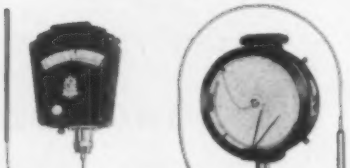

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Indicating
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the pioneer in mercury thermal controls

NO MATTER WHAT YOU MAKE, PARTLOW CONTROLS WILL HELP MAKE IT BETTER
For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

One quarter hp motor drives belt 300 fpm. Stainless clips help lift vegetables

juice. The belt is easy to clean and is expected to provide satisfactory service for at least another three years.

The 3-ply belt, 23 feet long and 16 inches wide, runs at a slope of 35 degrees at about 300 feet per minute and lifts the vegetables to a height of six feet. A one-quarter horsepower motor pulls the belt. Stainless steel clips, installed by Owen Canning, prevent vegetables from sliding down the belt.

Electronic Tank Weighing

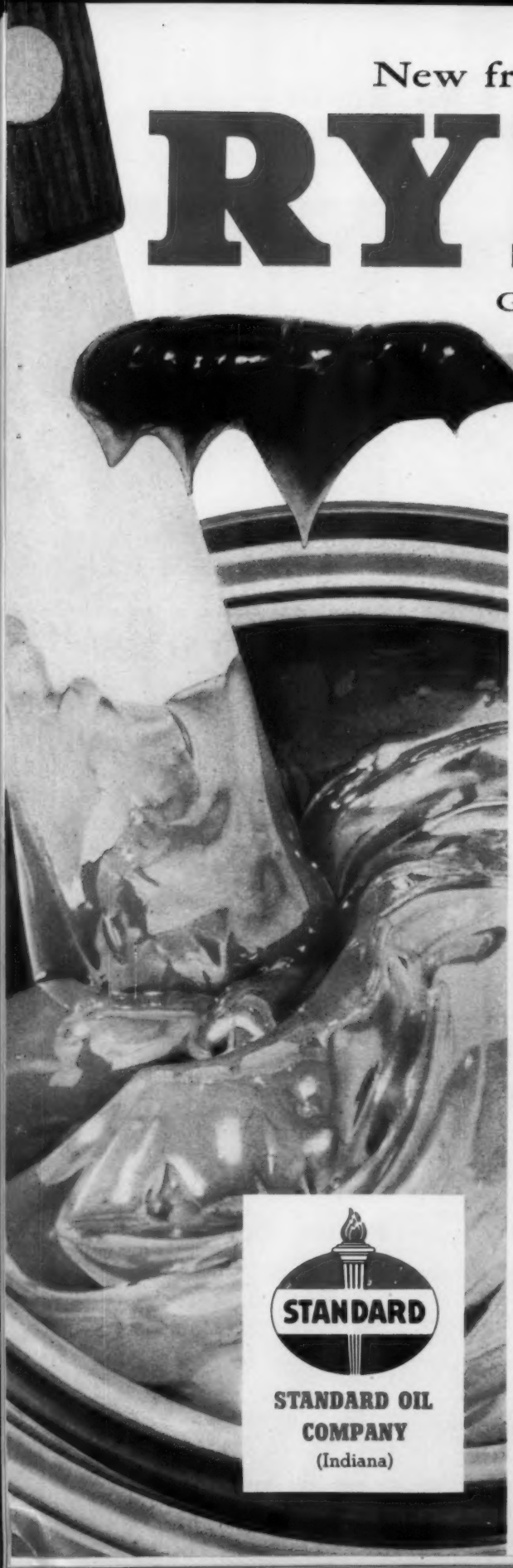
A TANK WEIGHING SYSTEM at Metal Hydrides, Inc., Beverly, Mass., is used in a process for manufacturing a new hydride useful in synthesizing pharmaceuticals and conducting hydrogenation reactions. Built by the Electronics and Instrumentation Div. of Baldwin-Lima-Hamilton Corp., the system consists of three Baldwin SR-4 2000-lb capacity load cells that support a mixing tank and an electronic indicator.

Three brackets, spaced equidistant around the tank and welded to it, serve as its only support. Immediately below each tank bracket is a coil through which cold water is pumped to reduce the temperature of the bracket. Below the coil is a bearing plate that rests on top of the load cell which is supported by the building steel. The load cells transmit a voltage that varies with the weight of the charge in the tank. Electrical leads connect the cells to the instrument panel. Completely enclosed and sealed, the cells are un-

New from Standard Oil

RYKON

GREASE



Standard scores major breakthrough in grease technology to bring you better lubrication . . . help you make important savings in grease use, application and inventorying.

Scientists at Standard Oil have developed a new non-soap, organic, grease thickening agent. This, plus other improvements in grease formulation, is now available in a new line of Standard greases named RYKON.

Mechanical stability—RYKON Greases show little change in consistency even under severe working.

Oxidation stability—Exclusive thickener in RYKON Greases inhibits oxygen absorption. This prevents costly corrosive action on bearings.

Water resistance—Extremely resistant to water washout.

High temperature stability—RYKON Greases have an ASTM dropping point of 480° F. They have exceptional heat stability.

Resistance to change—RYKON Greases remain soft and grease-like at sustained high temperatures, continue to give thorough lubrication.

Low temperature stability—RYKON Greases work readily at low temperatures, lubricate from a cold start.

Oil separation—RYKON Greases exhibit strong resistance to bleeding.

Rust preventive properties—RYKON Greases demonstrate superior natural qualities in prevention of rust.

To meet specific grease lubrication problems, greases in four Regular and three Heavy Duty grades are available. With a single RYKON multi-purpose grease doing all jobs in the plant, there's no wrong grease to use. Money invested in grease inventories is cut, storage and application facilities are reduced. Maintenance training is simplified.

Get the facts about RYKON Greases from the industrial lubrication specialist at the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

For more facts circle 544 on Reply Card

STANDARD

STANDARD OIL COMPANY
(Indiana)

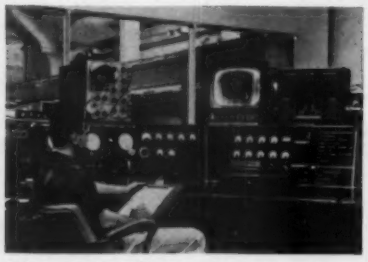
CLOSED-CIRCUIT TV *in action*

See how industry is solving tough problems *visually*—with GPL *ii-TV

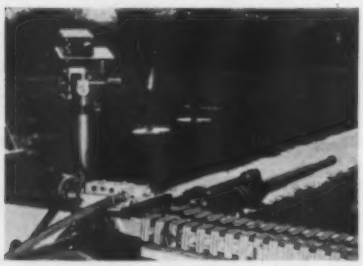
Quick record reference via *ii-TV* permits concentration of records in one area, saves this user $30,000 a year. GPL system is simple enough for anyone to operate.

Hard-to-see actions, as in the bouncing under-chassis of GM cars in road test, *above,* can now be viewed. Standard GPL TV camera takes hard knocks in stride.

Monitoring distant meter saves this manufacturer substantial sums in electric bills by avoiding peak loads. Reliable, remotely located TV camera by GPL needs no tending.



Observer is safe when dangerous operations, like this one involving radiation at Brookhaven National Laboratory, are seen through sharp pictures of GPL camera.



Even bone-shattering concussions can't disturb perfect pictures of GPL's Ruggedized camera, designed specifically for most severe applications.

Basic *ii-TV* system is finest, most dependable; costs less than medium-priced car. Mobile GPL TV Projector gives wall-size pictures 300% brighter than any other.

SEE *ii-TV** FOR YOURSELF

For further details, or demonstration of this precision-engineered system in your own office or plant by local GPL representative, write on your letterhead to Mr. N. M. Marshall, Sales Manager, General Precision Laboratory Incorporated, 61 Bedford Road, Pleasantville, N. Y.

*GPL's *industrial-institutional TV* system.

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General Precision Laboratory Incorporated

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OPERATION—PRODUCTION

(O and P begins on page 56)

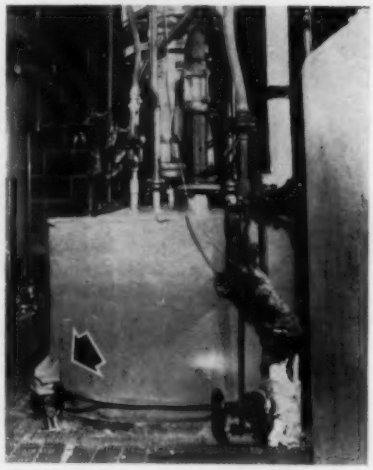

Fig. 1. One of three brackets (arrow) that support tank resting on load cell

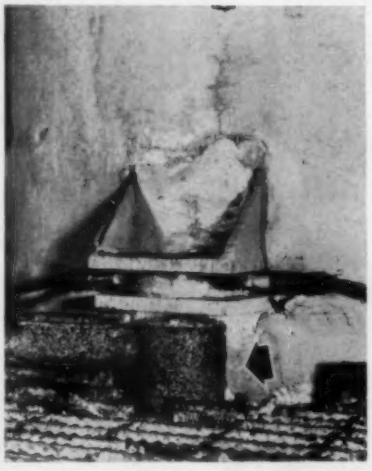

Fig. 2. Cooling water coil below bracket and SR-4 load cell (arrow) support tank

affected by any moisture or gases that may be in the area.

According to Metal Hydrides engineers, the system matched the weight of the initial charge with an accuracy better than ± 0.1 per cent.

Non-Electric Magnetic Separator

MAGNETIC SEPARATION of iron fines from finished zinc oxide is accomplished with this Eriez permanent magnetic rotating grate recently installed in a chute at the Columbus, Ohio, plant of American Zinc Oxide Company.

Powered with magnetic tubes of Alnico V, the non-electric grate revolves slowly through the passing flow

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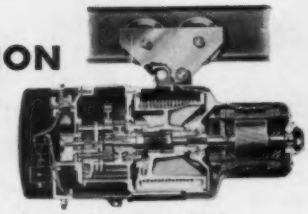
WRIGHT Electric Hoists / for lowest final cost

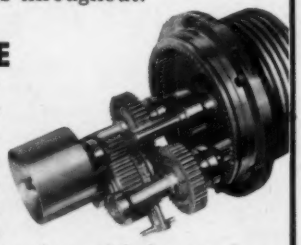
These features make WRIGHT Speedway Hoists your best buy for—

MORE PRODUCTION



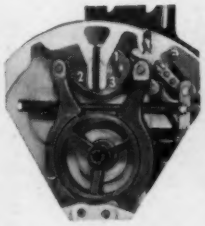
Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

LONGER LIFE



Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

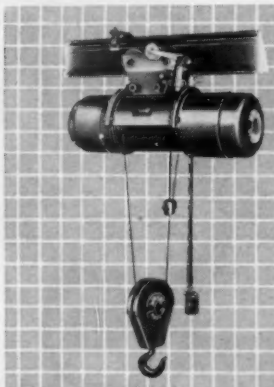
EASIER MAINTENANCE



There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

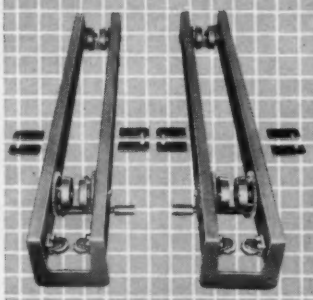
Better performance at lower cost by using WRIGHT units for local-built cranes

SPEEDWAY ELECTRIC HOIST



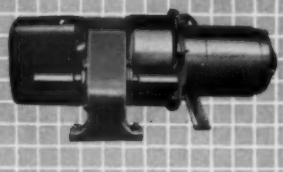
Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

END TRUCKS



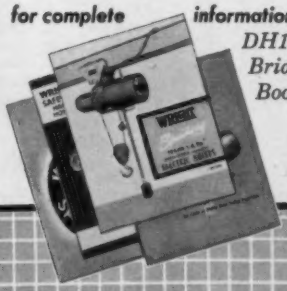
For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

CRANE DRIVE UNIT



For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well proportioned gear reduction. Units are equipped with WRIGHT designed solenoid "drag" brake. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

for complete information on WRIGHT Hoists and Crane components ask for: **Speedway Hoists:** *(Frame 1) Booklet DH133B, (Frame 2 & 3) Catalog E55A.* **Motor Driven Cranes:** *Underhung, Single Bridge, Bulletin #227; Top Running, Bulletins #DH448 or DH449* • **Crane Drive Units:** *Booklet DH-431A* • **Hand Traveling Cranes:** *Bulletins #DH-468 and #DH-348B*



Wright Hoist Division
AMERICAN CHAIN & CABLE

ACCO

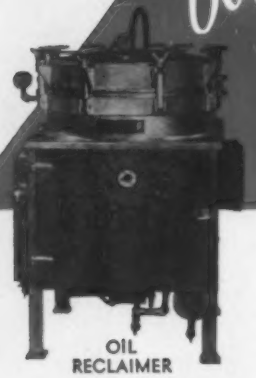
York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

HILCO OIL RECLAIMERS

REMOVE WATER, SLUDGE, ACID

for complete

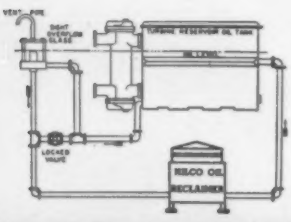
TURBINE OIL CONDITIONING...

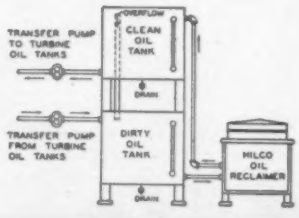


OIL RECLAIMER

The HILCO Turbine Oil Reclaimer is a self-contained, compact unit that will produce and maintain oil free of all solids, sludge, acids, moisture and air, keeping the oil in first class condition. Its purifying process is a continuous, all electric, automatic operation, requiring infrequent attention. It removes contaminants as fast as they are formed, maintaining lubricating oil at full value of new oil. HILCO Oil Reclaimers will also purify compressor, hydraulic, insulating, Diesel and gas engine lube oils.

Purifies Turbine Oil by Continuous or Batch Purification . . .





A continuous, direct-connected, foolproof oil reclaiming system. Oil flows from turbine reservoir tank to sight overflow glass, to HILCO Oil Reclaimer, and back to reservoir.

A batch system designed to serve one or more turbines when it is desired to withdraw all the oil from reservoir for complete periodic batch reclaiming to restore all oil as good as new.

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IN CANADA: Upton-Bradeen-James Ltd., 890 Yonge St., Toronto; 3464 Park Ave., Montreal

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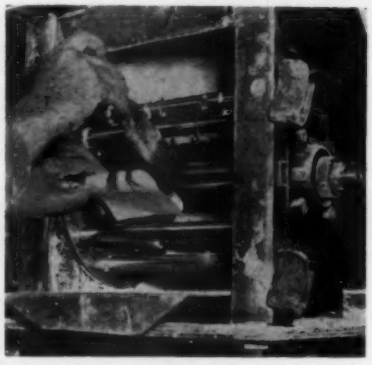
OPERATION—PRODUCTION

(O and P begins on page 56)



Non-electric magnetic tubes rotating in chute trap iron. Door eases cleaning

of material, pulling out any stray iron particles. An access door is provided in the chute for periodic removal of the accumulated iron fines.

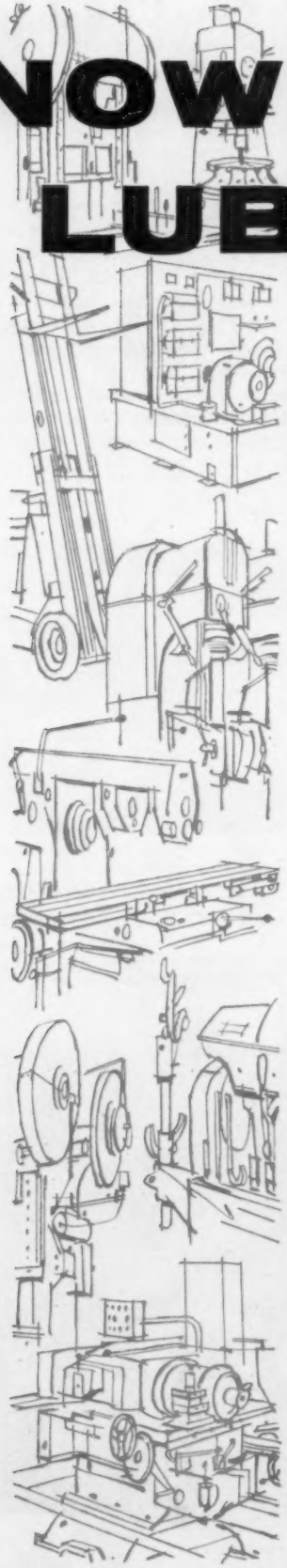
Farm Disc Speeds Roof Removal

"FARMING" ON A ROOF 100 ft above the ground, with a tractor and disc, helped to speed up the task of removing several layers of old asphalt roofing on a syrup mill owned by the A. E. Staley Mfg. Co., Decatur, Ill. The 10-hp tractor, weighing 1200 lb, was hoisted to the rooftop by one of the Staley cranes and rapidly cut up the old roofing for easy removal.

The International tractor and disc were rented by the hour.

Tractor and disc cut up old roofing for easy removal, speed up roof repair job

NOW! ATLANTIC LUBRICANT 54



. . . the one lubricant for practically every industrial need

New Atlantic Lubricant 54 is industry's closest approach to the universal grease lubricant. The use of this distinctively purple grease in your plant practically assures the correct choice in any application. It has given outstanding performance in all types of machinery.

Every shop, large or small, can make economical use of Atlantic Lubricant 54 because it gives

. . . multiplicity of use—reduces chance for error, cost of warehousing, and handling

. . . outstanding rust protection—protects ferrous surfaces under wet conditions

. . . excellent lubrication performance from very low to extremely high temperatures

. . unusual stability against oxidation and softening under rugged working conditions

. . positive identification due to its purple color

This product is available from warehouses conveniently located throughout Atlantic's marketing territory and may be ordered through the nearest office listed below.

ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

PHILADELPHIA, PA.
260 So. Broad St.

PITTSBURGH, PA.
Chamber of Commerce Building

PROVIDENCE, R. I.
430 Hospital Trust Building

SYRACUSE, N. Y.
Salina and Genesee Streets

READING, PA.
First and Penn Avenues

CHARLOTTE, N. C.
1112 South Boulevard

For more facts circle 548 on Reply Card

Only New HALLOWELL *ERECTOMATIC*® Steel Shelving

LESS TIME, MORE UNITS PER HOUR, lower costs with Hallowell ERECTOMATIC steel shelving. Maximum adaptability to meet changing conditions, too.

No matter what type of shelving you need—open, closed, bin units, ledge units, counter or cabinets —there's new Hallowell ERECTOMATIC® steel shelving to make your job easy. The unique built-in locking device* speeds assembly and rearrangement of shelving. To position a shelf—just slide it into place on the shelf supports, press the locks, and the shelf is locked. To reposition a shelf—release the locks, pull the shelf straight out, slide it straight in on its supports at the new location, and press the locks. It takes only seconds to do the complete job.

For complete information, see your Hallowell distributor. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

*Patent applied for

TWO MEN ASSEMBLED new Hallowell ERECTOMATIC steel shelving in just over 10 minutes. Closed unit was 36 in. wide, 18 in. deep, 7 ft. 3 in. high, complete with seven shelves. Standard models of other design required from 13-55 min. Table shows test results.

Brand	Time to Assemble (Min.)	Units Per Hour
Erectomatic	10.24	5.75
A	13.23	4.53
B	14.24	4.21
C	16.30	3.68
D	18.12	3.31
E	25.03	2.40
F	55.03	1.09

FAST ASSEMBLY. Just position the shelf supports, insert the shelf, and press the unique locking device. No tools or special instructions necessary.

gives you all these extra-value features

QUICK SHELF CHANGE. Just release the locks, remove the shelf and its supports, relocate the shelf, and press the locks. It takes only seconds.

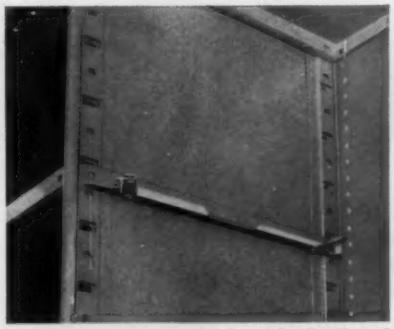
STRAIGHT-IN, STRAIGHT-OUT SHELF CHANGE. No tilting to interfere with any other shelf. No time wasted unloading shelves or removing bin fronts, partial dividers, label holders.

INDEPENDENT SHELF POSITIONING. Each shelf is an independent unit. Can be removed and repositioned without disturbing any other part. All shelves in a rack can be aligned.

FULL USE OF SHELF AREA. No angles or tees, and beaded corner posts prevent waste of valuable storage space. No box guides are needed.

COMMON SIDE PANELS AND POSTS save assembly time. Also save material between adjacent units in a rack. And both back and side panels are one-piece.

BEADED POSTS AND FLANGED SHELVES prevent snagging of clothing or stored goods. Also prevent injuries from sharp, ragged edges.



FULL DEPTH SHELF SUPPORT. Load is distributed over full depth of shelf. No buckling is possible. Reinforcements can be added when they are required.

4 CLASSES OF SHELVES. Regular, medium, heavy, and extra-heavy shelf construction meets all load requirements. Made to government specifications. Extra-heavy shelf shown.

STANDARD PRESSED STEEL CO.

HALLOWELL® SHOP EQUIPMENT DIVISION SPS

JENKINTOWN PENNSYLVANIA

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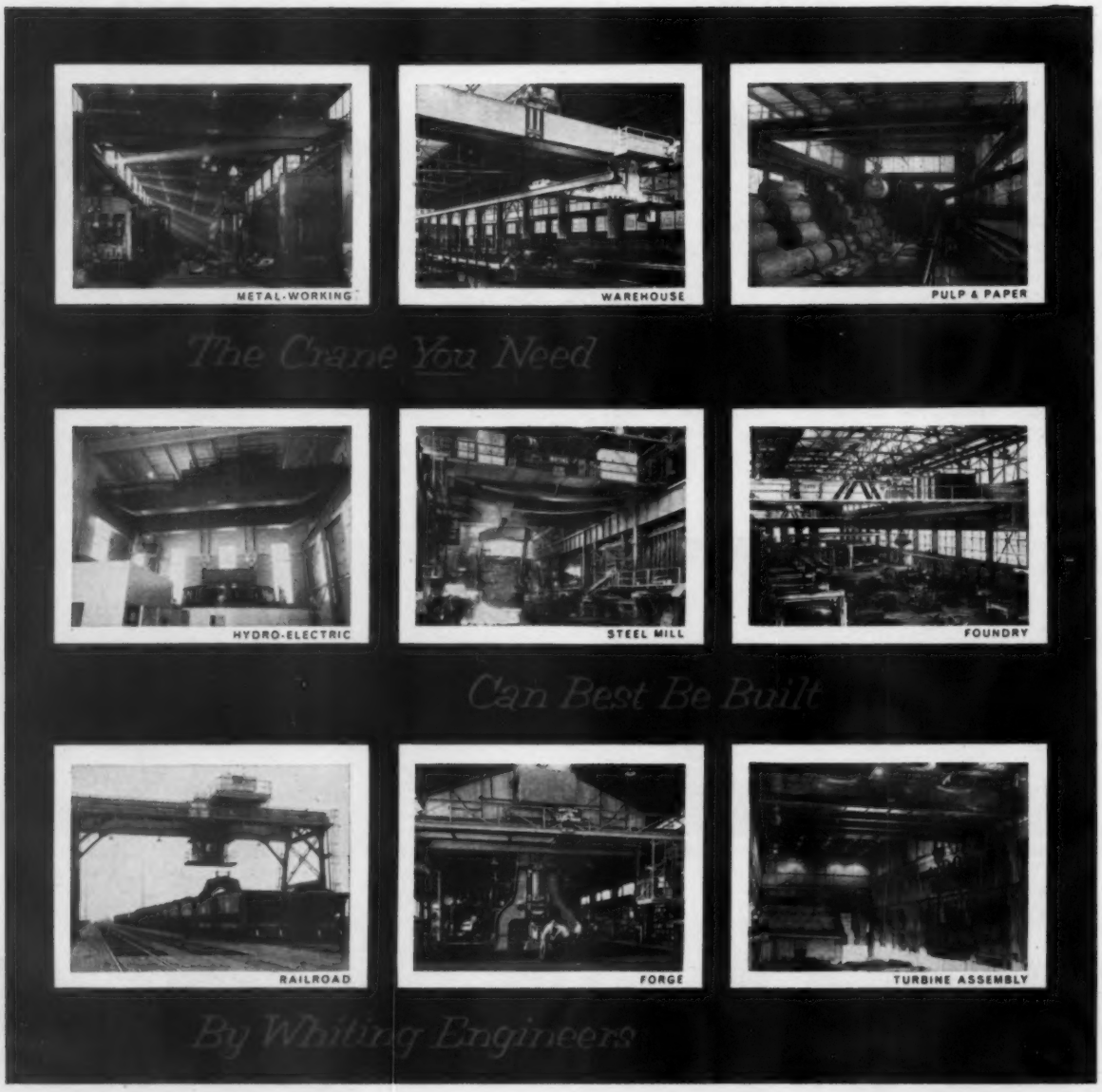


What kind of crane will assure you of peak performance and lowest cost? Whiting engineers know. For over 70 years Whiting has designed and built cranes for every industry. Whiting engineers have the imagination and experience to visualize new solutions to your materials handling problems. On the job, they closely supervise every phase of assembly and installation. They are always available for counsel and assistance—even after your crane has been in service for years. Get the full benefits of broad experience, practical imagination, thorough follow-through—call in a Whiting engineer at the "talking stage" of your new crane.

Write for Bulletin 80.

Read the story of "Whiting Engineered Cranes."

WHITING
Engineered
CRANES

WHITING CORPORATION
15675 Lathrop Avenue, Harvey, Illinois

MANUFACTURERS OF CRANES, TRAMBEAM HANDLING SYSTEMS, TRACKMOBILE, FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT

For more facts circle 550 on Reply Card

Companies using General Electric's Simplified Lamp Replacement Plan save as much as $7,500 a year!

E. A. Linsday, well-known G-E authority on industrial lighting.

SPECIAL REPORT by E. A. Linsday

FACTORIES, like McDonnell Aircraft Corp., realize big savings annually with General Electric's Simplified Lamp Replacement Plan. They maintain a higher light level, too.

OFFICE BUILDINGS are kept brighter—at lower cost. Brown Shoe Company uses this new relamping system in their new St. Louis office—saving about 10¢ per lamp per year!

SMALL BUSINESSES can profit, too, by replacing all their lamps at one time. Naturally, the dollar savings will not be as important as the savings in time and trouble

CLEVELAND, OHIO—Ask anyone here at General Electric why they're so enthusiastic about the G-E Simplified Lamp Replacement Plan—replacing fluorescent lamps in groups instead of one-at-a-time—and he'll explain it this way: "If you knew exactly when your car was on the brink of costing you a big repair bill, you'd stop driving it just short of that point and trade it in, wouldn't you? Well, we control the making of our lamps so carefully that we are able to tell you the most economical time to change them. This enables our customers to replace *all* the G-E Lamps in a given section or department before the great majority are about to burn out." The result? Fewer interruptions of office or factory work; a cleaner, brighter lighting system; fewer starter and ballast breakdowns; more light for the money.

30 LAMPS OR 30,000—Regardless of its size, your company can benefit by General Electric's Simplified Replacement Plan. Brown Shoe Company does this in their beautiful new St. Louis offices. By changing their 5,000 lamps every 18 months, they save about $500 a year. At McDonnell Aircraft, they replace over 30,000 G-E Lamps regularly with a reported yearly savings of $7,500! On the other hand, the owner of a filling station in Burlington, Vermont, replaces his few lamps yearly and he saves, too. Naturally his dollar savings are of secondary importance to his savings in time and annoyance.

LET G-E's GROUP RELAMPING PLAN CUT YOUR COSTS. Since one-at-a-time lamp replacement adds up to a big expense, it's easy to make substantial savings by taking advantage of the *uniform performance* of G-E lamps. Early burnouts are avoided. Actual results show that 99 out of 100 General Electric fluorescent lamps will still be burning after a year's service in single-shift plants.

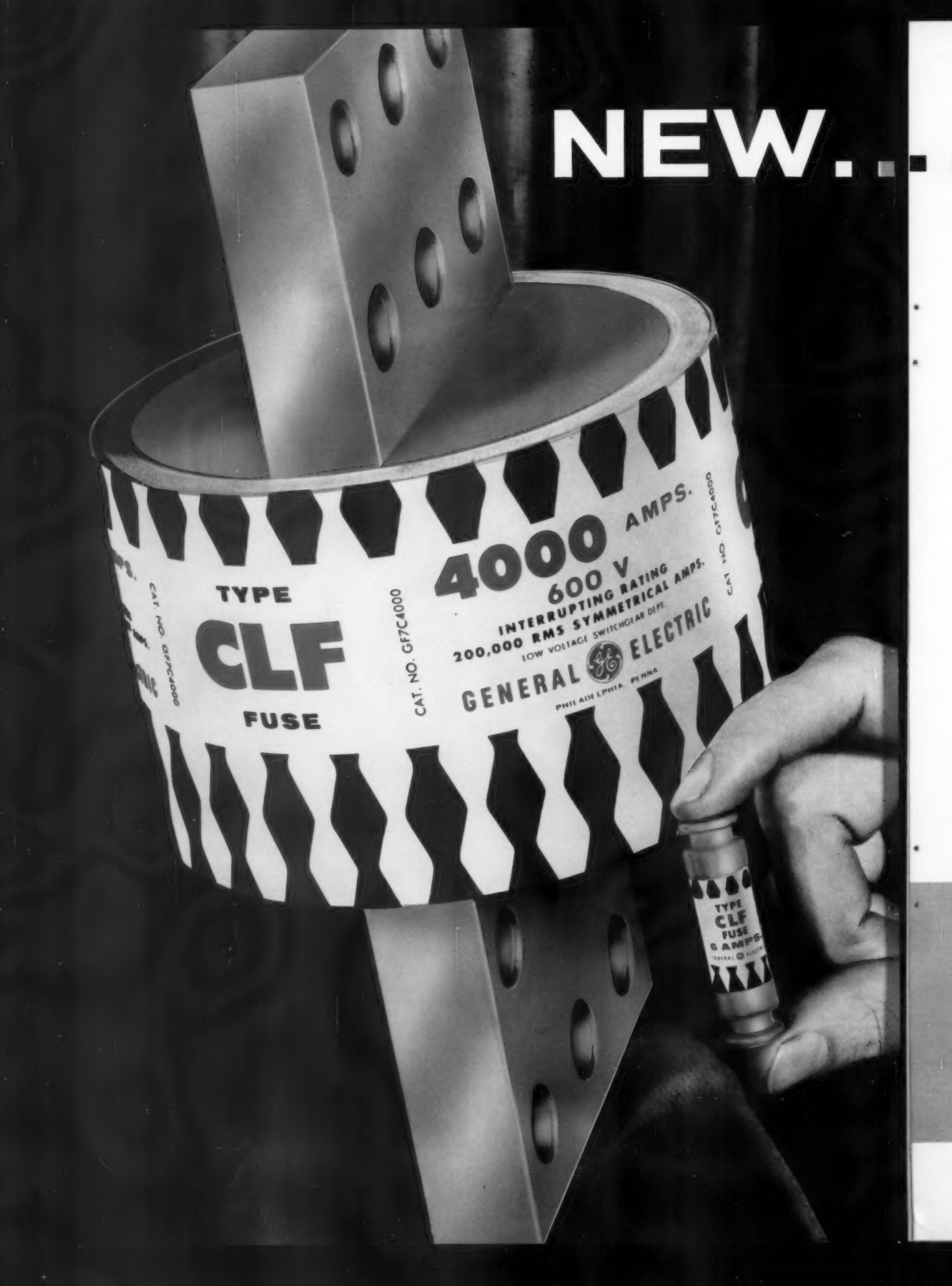
GET THE WHOLE STORY on G-E's Simplified Lamp Replacement Plan. Write for the booklet, "Group Relamping Pays Dividends"—General Electric Company, Large Lamp Dept. PE-5, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 551 on Reply Card

For more facts circle 552 on Reply Card ⟶


NEW...
TYPE
CLF
FUSE
CAT. NO. GF7C4000
4000 AMPS.
600 V
INTERRUPTING RATING
200,000 RMS SYMMETRICAL AMPS.
LOW VOLTAGE SWITCHGEAR DEPT.
GENERAL ELECTRIC
PHILADELPHIA, PENNA.
CAT. NO. GF7C4000
TYPE
CLF
FUSE
6 AMPS

. . from General Electric a complete line of Current Limiting Fuses

RATINGS FROM 6 TO 4000 AMPERES
INTERRUPTS 200,000 AMPS SYMMETRICAL

With a laboratory proven interrupting rating of 200,000 rms symmetrical amperes, General Electric's new line of Current Limiting Fuses now offer you better protection on circuits from 6 to 4000 amperes.

Your General Electric Apparatus Distributor will soon be able to offer you the advantages of local warehousing, fast delivery, and can now give you personal assistance in selecting the fuse to fit your needs.

	250 volts A-C or D-C	250 volts 60 cycle A-C	600 volts A-C or D-C	600 volts 60 cycle A-C	480 volts 60 cycle A-C
CURRENT RATING (Amperes)	6	300	6	300	1600
	15	400	15	400	2000
	20	500	20	500	2500
	30	600	30	600	3000
	40		40	800	4000
	60		60	1000	
	80		80	1200	
	100		100		
	150		150		
	200		200		

Progress Is Our Most Important Product

GENERAL ELECTRIC

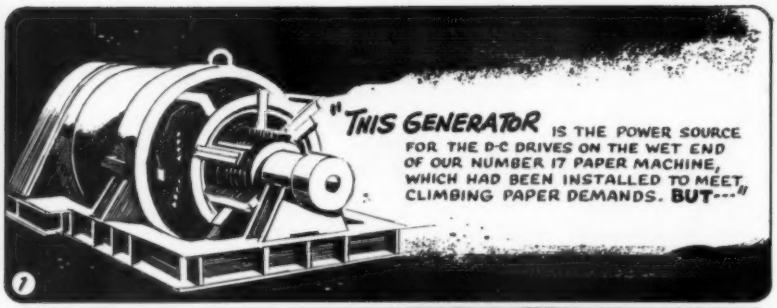
Although the 4000-amp giant of General Electric's CLF fuse line dwarfs its 6-amp "little brother," all ratings have the same laboratory tested current limiting characteristics. Ask your G-E distributor or General Electric sales engineer about them soon.

For complete descriptive information (GEA-6319B) on Type CLF fuses, write Section 528-1, General Electric Company, 1 River Road, Schenectady 5, N. Y., or ask your G-E distributor or General Electric representative for a copy of the CLF fuse bulletin.

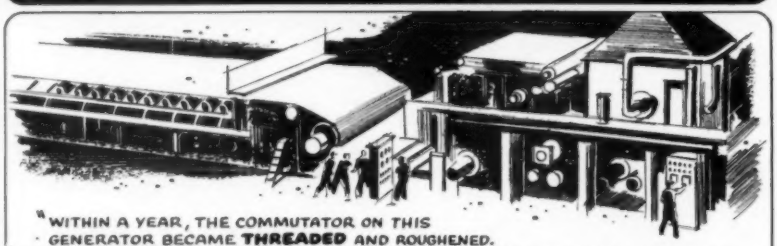
"WE HAD TO UNRAVEL COSTLY THREADS"

A GENERAL ELECTRIC CARBON BRUSH CASE HISTORY

AS TOLD BY Nelson Allen
SUPERINTENDENT, ELECTRICAL MAINTENANCE
SCOTT PAPER CO.
CHESTER, PA



1 "THIS GENERATOR IS THE POWER SOURCE FOR THE D-C DRIVES ON THE WET END OF OUR NUMBER 17 PAPER MACHINE, WHICH HAD BEEN INSTALLED TO MEET CLIMBING PAPER DEMANDS. BUT---"



2 "WITHIN A YEAR, THE COMMUTATOR ON THIS GENERATOR BECAME **THREADED** AND ROUGHENED. SPOT REPAIRS WERE NECESSARY TO KEEP EVERYTHING RUNNING OK UNTIL THE ANNUAL MAINTENANCE SHUTDOWN. AT THAT TIME THE COMMUTATOR HAD TO BE STONED--- A TIME CONSUMING AND COSTLY EXPERIENCE"

3 "THREADING PERSISTED. NO MATTER WHAT ADJUSTMENTS WE MADE, FREQUENT MAINTENANCE WAS NECESSARY. FACED WITH CONTINUING THIS EXCESSIVE AND WORRISOME MAINTENANCE, WE CALLED OUR GENERAL ELECTRIC REPRESENTATIVE."

4 "WHICH ONE OF MANY VARIABLES WAS THE KEY TO OUR PROBLEM? THE G-E ENGINEER STUDIED EVERYTHING--- OPERATING AND LOAD CHARACTERISTICS, ATMOSPHERE, COMMUTATOR, CARBON BRUSHES AND HOLDERS."

5 "THIS GENERATOR', HE SAID, 'OPERATES MOSTLY UNDER **LIGHT** AND **VARYING LOADS**. THIS CAN DISTURB NORMAL COMMUTATING CONDITIONS. YOU NEED CARBON BRUSHES SPECIALLY DESIGNED TO GIVE GOOD COMMUTATION ON SUCH SERVICE, AND I RECOMMEND THIS G-E TREATED BRUSH."

6 "AND RIGHT HE WAS! SINCE SWITCHING TO THESE G-E BRUSHES THREADING AND ROUGH COMMUTATOR CONDITIONS ON 17'S GENERATOR HAVE BEEN ELIMINATED, REDUCING MAINTENANCE TIME AND EXPENSE.-- THANKS TO G.E.'S ENGINEERING ASSISTANCE AND COMPLETE LINE OF CARBON BRUSHES."

NO MATTER WHAT BRUSHES YOU NEED FOR YOUR G-E MACHINES, GENERAL ELECTRIC CAN SERVE YOU FROM ITS COMPLETE LINE OF CARBON BRUSHES, READILY AVAILABLE, AND BACKED BY ENGINEERING ASSISTANCE.

AND REMEMBER-

GENERAL ELECTRIC IS THE ONLY MANUFACTURER OF BOTH CARBON BRUSHES AND MOTORS AND GENERATORS.

CONTACT YOUR G-E APPARATUS SALES OFFICE OR DISTRIBUTOR, OR WRITE FOR BULLETIN GEA-5597, GENERAL ELECTRIC CO., SECTION 774-4 SCHENECTADY, N.Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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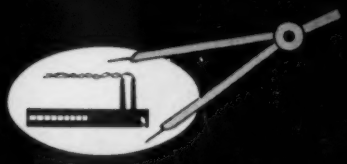
USING

DU PONT ELASTOMERS

neoprene · Hypalon



in industry

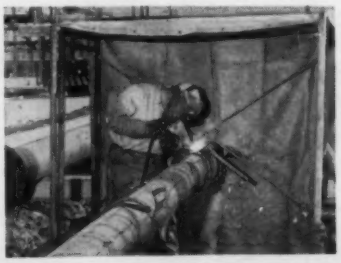
HYPALON hose pipes 60,000 lbs. of concentrated acid daily—in use 21 months without a failure

NEOPRENE keeps welding curtains, tarps fire-resistant

A neoprene coating on welding curtains and tarpaulins keeps them fire-resistant and adds to their service life. Although they are made of fire-proof materials—glass cloth for the curtains and asbestos for tarpaulins —they are often splashed with oil and grease. The neoprene coating keeps these materials from soaking into the fabric. Thus, sparks striking the curtain and molten metal falling on the tarpaulin will not ignite the cloth — neoprene will not support combustion.

Neoprene provides other advantages as a protective coating. Because oil and grease are prevented from attacking the welding curtains and tarps, they can be scraped clean or laundered without damage. It also makes fabrics tear-resistant and impervious to weathering—these curtains will outlast any comparable sheeting lacking the protection of neoprene coating.

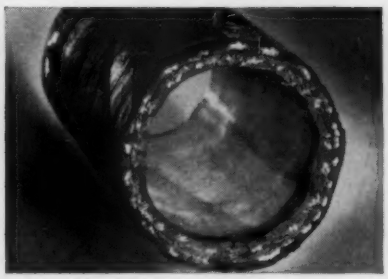
Neoprene offers savings wherever you need a durable resilient material for tank linings, hose, gaskets or other applications. It resists oil, chemicals, heat, sunlight, weather. Send coupon for more details.



Neoprene coating won't support combustion, stops oil and grease from soaking curtain, keeps it fire-resistant.

For more facts circle 554 on Reply Card

Rubber hose previously used for acid discharge lines charred and cracked after only 8 weeks' use.



HYPALON hose shows no internal acid damage, exterior aging or weather cracking in nearly 2 years.

Hose still safe and serviceable despite punishment of 60°-66° Be. sulfuric acid pumped under 30 psi.

Two costly accidents brought the problem of handling concentrated sulfuric acid to a head for Rogers Cartage of Chicago — a tank truck hauler of acids and other chemicals. In one case, a conventional rubber acid hose burst and sprayed several men with acid. In another, a rubber hose burst and 30,000 lbs. of acid were lost.

HYPALON-lined acid hose supplied the answer and ended the accidents. Experimental use on company trucks worked so well that Rogers equipped their entire fleet with 3" HYPALON discharge hose. It provides long, safe service because HYPALON is exceptionally acid-resistant.

Jack Kidder, Safety Director at Rogers Cartage, has this to say about HYPALON: "That hose was a real lifesaver. We started using it in August, 1955, and have never had a HYPALON hose fail." He adds, ". . . hose inspection indicated no burning or breaks. They appear as new as the day they were put in service."

HYPALON has other qualities you will find useful where severe service conditions exist — it resists chemicals, heat, sunlight and weathering, and has complete ozone resistance. The coupon will bring you complete information.

One driver easily handles an 8′ length of 3" HYPALON hose with safety.

DU PONT
REG. U. S. PAT. OFF.

HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

☐ I am particularly interested in _____

☐ Please add my name to the mailing list for your free publication, the ELASTOMERS NOTEBOOK.

E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. PL-5
Wilmington 98, Delaware

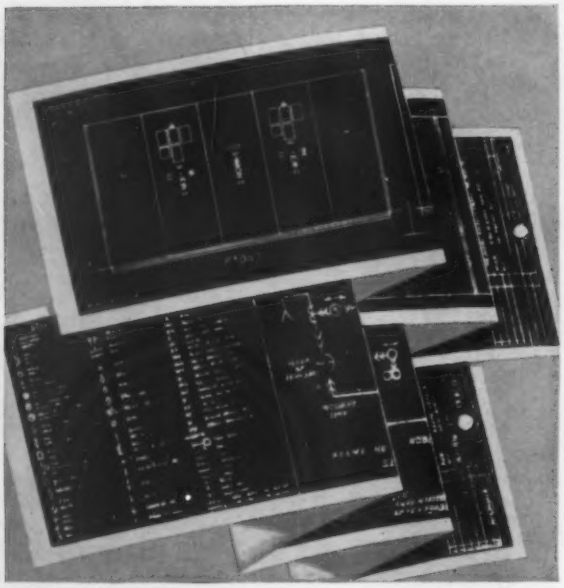
Name _____
Firm _____
Address _____
City _____ State _____

I-T-E

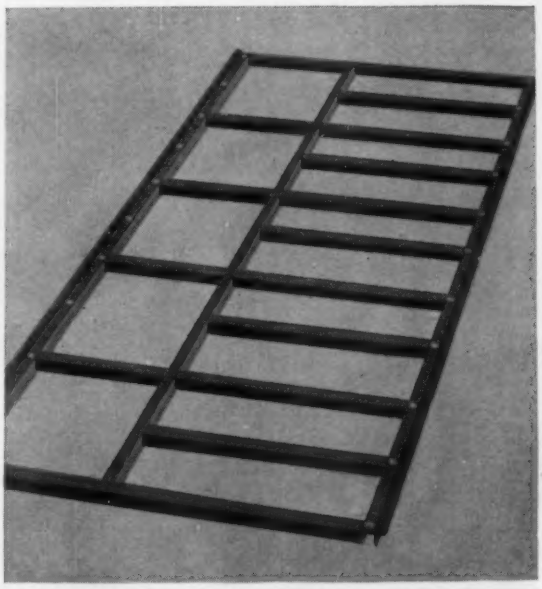
METAL-CLAD SWITCHGEAR

EASY INSTALLATION SAVES YOU TIME AND TROUBLE

I-T-E pre-engineers your installation before shipment... eliminates last-minute on-the-job fitting of switchgear to channel base



1. Complete drawings in advance. Shortly after placing your order, you will receive complete drawings showing the floor plan layout, outline dimensions, and single line diagram of the entire installation.



2. Prefabricated, painted channel base delivered first. Shipped upon request, well ahead of other equipment. Foundation bolt holes are pre-drilled to align with holes in switchgear housing.

Long before delivery of your I-T-E Metal-Clad Switchgear, you begin benefiting from the preliminary engineering and construction work which is a part of I-T-E's service to customers. It's another extra assurance of dependable performance you can expect from I-T-E equipment.

Floor plan, outline and single line drawings are supplied well in advance. Hence conduit can be run, floors poured, channel base set in place, and cables pulled. The switchgear, when it arrives, can be moved into position and connected according to plan quickly—saving you many installation hours on your premises.

I-T-E's advance planning for you helps insure that your switchgear installation can be completed well within the time allowed by your construction schedule.

In addition, of course, you benefit from the superior engineering, design and construction of the various components making up an I-T-E switchboard—all of which contribute to its faithful trouble-free performance for years after the installation.

If you are planning new construction, get full details on I-T-E Metal-Clad Switchgear, rated through 13.8 kv, 3000 amperes continuous and 750 mva interrupting. Contact the I-T-E sales office near you. Or write for Bulletins 7004B and C. I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Phila. 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY—Switchgear Division

IN CANADA: EASTERN POWER DEVICES, LTD.

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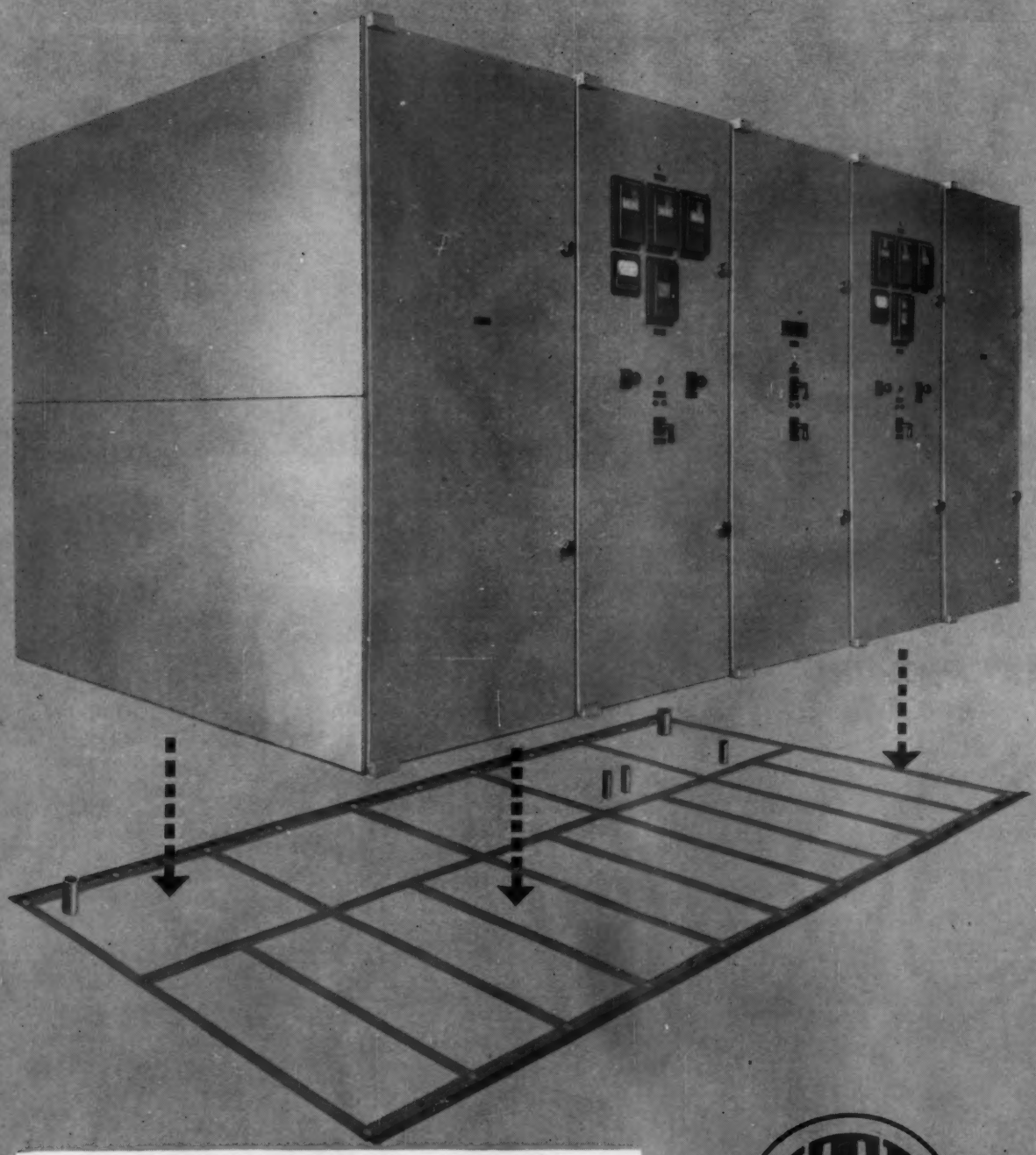


3. Sure fit—no delay. Channel base is embedded into the floor first. Then when switchgear is delivered it can be installed immediately. Sturdy I-T-E housings can be lifted in one piece by toe jack or chain hoist without distortion.

I-T-E

MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

How to get MORE PRODUCTION with GREATER SAFETY ...from your power-operated machinery

Typical MICRO SWITCH Trip Control setup for a large friction clutch machine. In this application each operator must operate two switches before the press will operate.

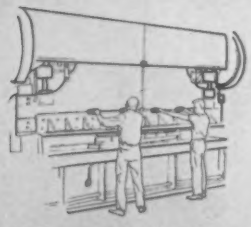
MICRO SWITCH Trip Controls have wide range of uses

FOR SMALL PRESSES

Provides faster, safer operation with less effort, of small two-hand presses, riveting machines, etc. Provides single-stroke operation should none exist in the clutch.

FOR PAPER CUTTERS

Complete protection is afforded operator in cutting or trimming either flat stock or labels.



FOR LARGE PRESSES

Makes operation of large presses and press brakes safer and less tiring. Any number of operator stations may be "wired into" the control circuit. Complete control of the machine throughout the cycle eliminates work spoilage.

WIDE VARIETY OF PRESS CONTROL METHODS AVAILABLE

1. One operator—two hands.
2. One operator—two hands or one foot.
3. One operator—two hands or either hand or one foot.
4. Two operators—one to four hands, any combination, or one foot.
5. Three operators—one to six hands, any combination, or one foot.
6. More than six hands, any combination, or one foot.

INCREASED PRODUCTION WITH INCREASED SAFETY

- Instant electrical response
- Feather-touch operation
- Easy control changes
- Decreased operator fatigue
- Two-hand operation
- Cannot be "cheated"
- Interlock prevents power stroke while changing dies

Let us send you complete information on MICRO SWITCH Trip Control and the name of the distributor nearest you. Ask for catalog No. 65.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

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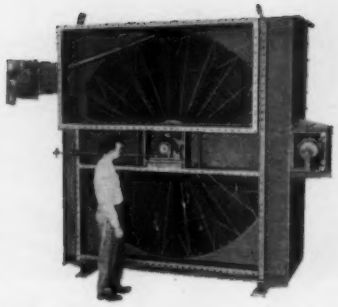


HOW MANY STACK BTUs DO YOU BUY EACH YEAR?

Whether you burn it — or dissipate it up the stack — every BTU costs you money. In fact:

Yearly cost of fuel often equals the cost of your boiler. That's why heat recovery — or dollar recovery — is so important. Boilers simply have huge appetites for fuel . . . fuel that's constantly going up and up in cost.

And small boilers are no exception. Even with relatively small boilers — that is, between 25,000 and 250,000 lbs per hr—substantial heat recovery is possible. With a Package Ljungstrom Air Preheater, fuel consumption is most often reduced 10% or more! As a result, many plants have written off their Ljungstrom within two years.

Get more steam, and cleaner stack gases. Put it another way. The BTUs that you save with a Package Ljungstrom can be used to increase boiler output. What's more, higher combustion temperatures cut slagging . . . keep stack gases clean . . . allow use of cheaper fuels . . . reduce corrosion.

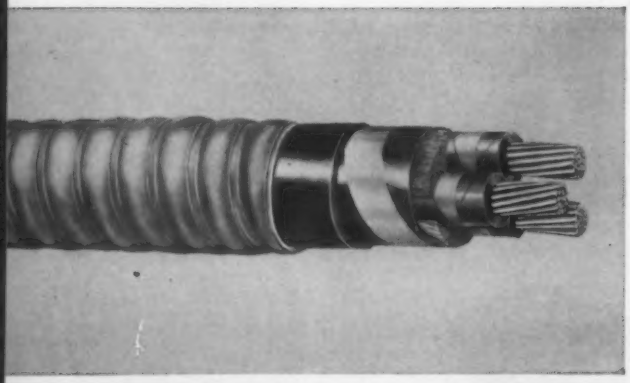
Comes complete, ready to install. Determine for yourself how easily a low-cost, *shop-assembled* Package Ljungstrom can be applied to your generating or process system. Ask for our brand-new 16-page brochure. It's yours with our compliments, simply by writing to the address below.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

For more facts circle 557 on Reply Card

For air conditioning: Three conductor, 500 Mcm, 37 wire, $\frac{9}{64}$" varnished-cambric insulated Anaconda Duralox Cable was quickly, easily installed in older building

PROBLEM: Installing new circuits in old building

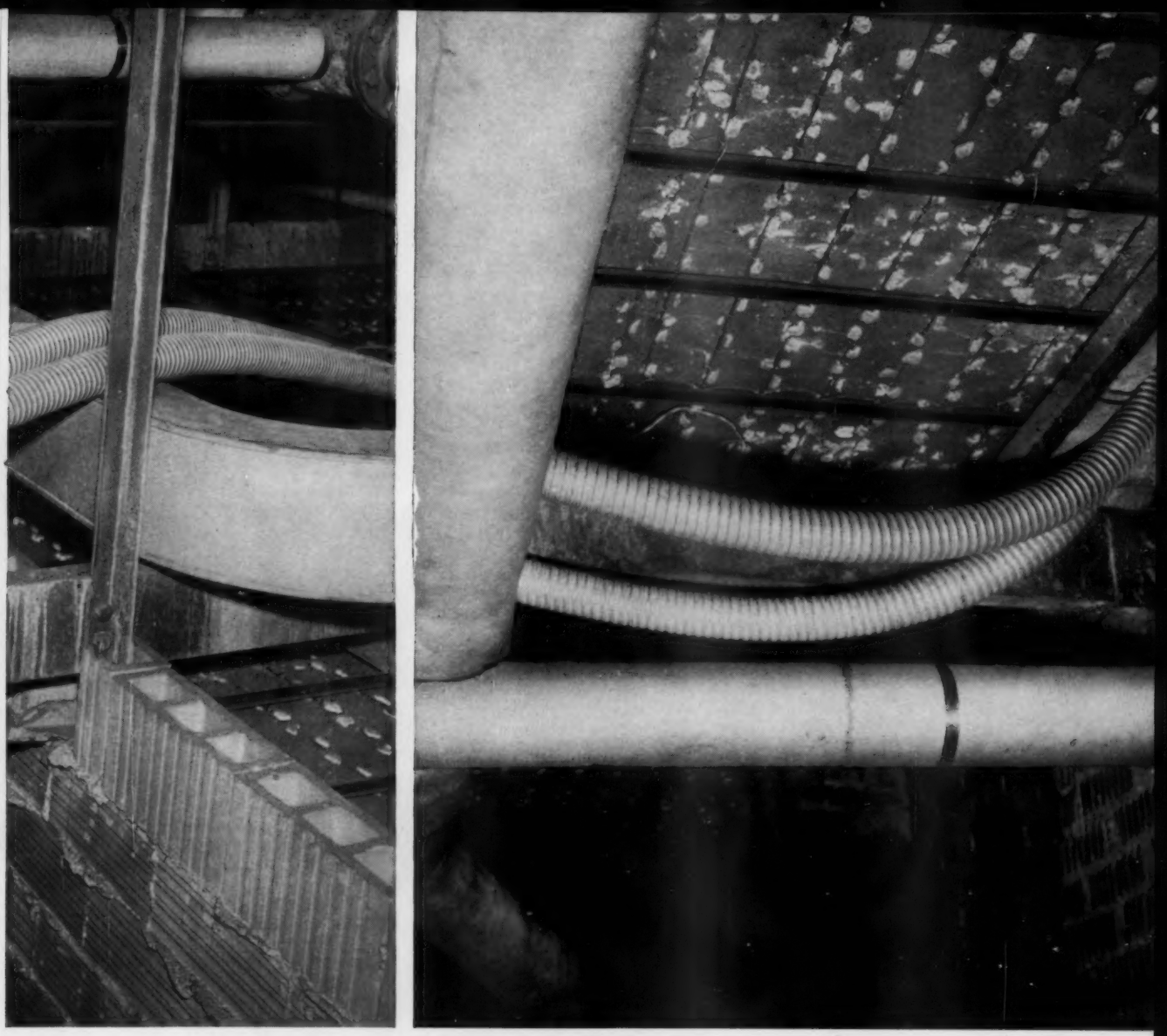


Anaconda Duralox Interlocked-armor Cable.

Installing new circuits in an old building – whether for air conditioning, as the case here, or for new machinery or new load centers – can be tough and costly. You either have to go around existing obstructions, a laborious job with rigid conduit, or remove them.

The ideal solution is Anaconda Duralox Interlocked-armor Cable.

Because it is flexible, Duralox Cable is quick, economical to install – indoors or out – with simple supporting devices. It trains easily around corners, columns and other obstructions in *long, unbroken*



to handle new load. Cable runs from breaker box in west wing (left) through loft of roof (center) to side wall of building and down wall (right) to breaker box on lower floors.

SOLUTION: Duralox Interlocked-armor Cable

or: *How to do a hard job the easy (and low-cost) way*

runs. Circuits are easy to relocate . . . always accessible. Duralox's interlocked metal-tape armor affords excellent protection against mechanical damage.

Anaconda Interlocked-armor Cable is available in sizes No. 6 Awg to 750 Mcm – copper or aluminum conductors – up to 15 Kv. Underwriters' approved for 600 volts and 5000 volts. With rubber, plastic, or varnished-cambric insulation.

NEW BULLETIN DM 5606 on Anaconda Duralox Cable gives you full information. Write for your copy today. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

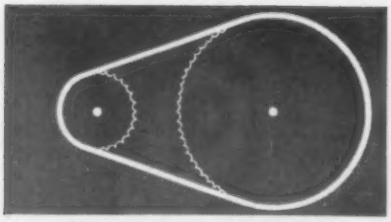
87406

ASK THE MAN FROM **ANACONDA®**

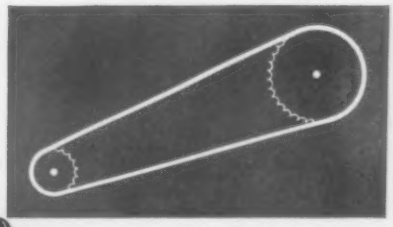
FOR **INTERLOCKED-ARMOR CABLE**

For more facts circle 558 on Reply Card

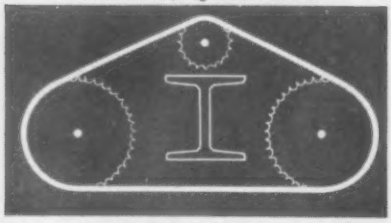
VERSATILE DIAMOND CHAINS SOLVE MANY DRIVE PROBLEMS AT LOW COST...



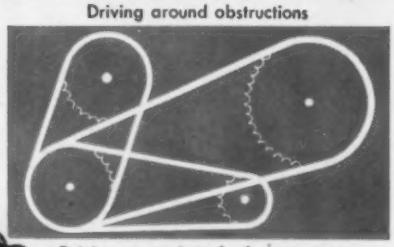
Short center, high ratio drives



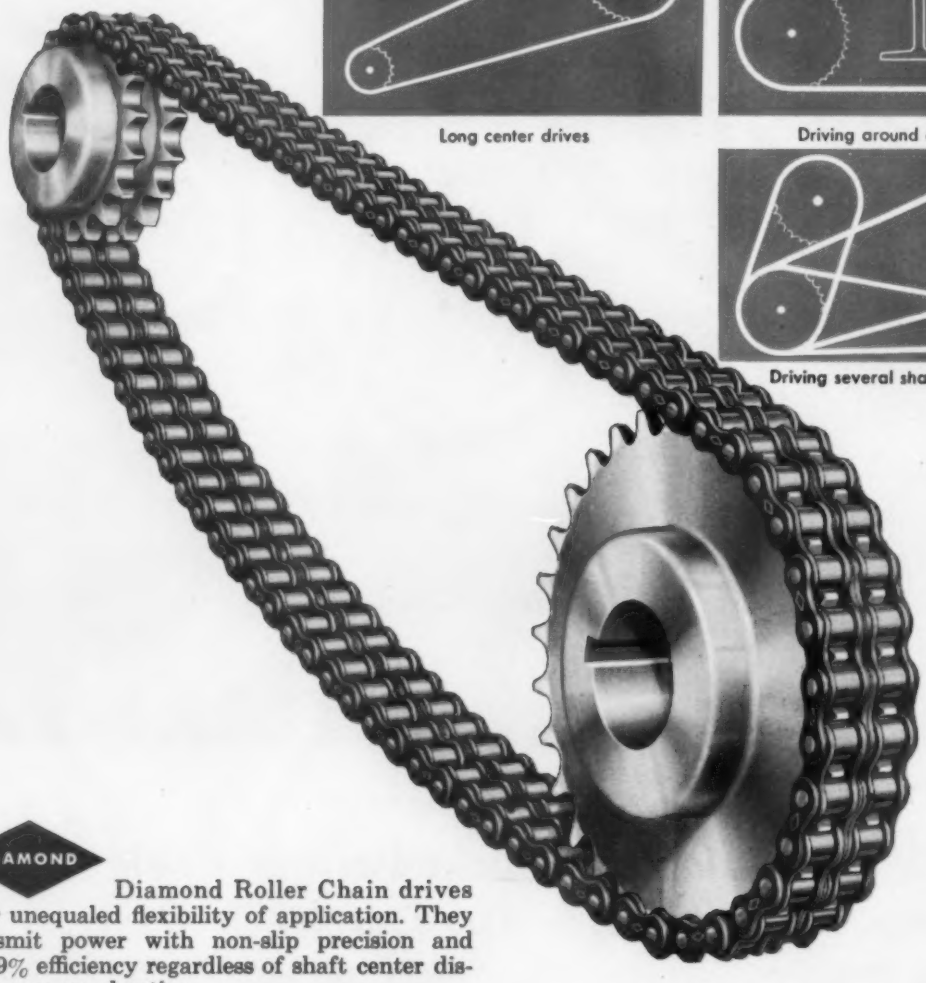
Long center drives



Driving around obstructions



Driving several shafts from one source



DIAMOND

Diamond Roller Chain drives offer unequaled flexibility of application. They transmit power with non-slip precision and 98-99% efficiency regardless of shaft center distances or speed ratios.

Obstacles in the drive path are easily avoided. Diamond Roller Chain's light weight and compactness allow lighter machinery construction, eliminate power consuming gear trains and the many shafts and bearings they require.

Diamond Engineers are available now to help you solve your drive problems. Write or call today.

DIAMOND CHAIN COMPANY, Inc.
Dept. 614, 402 Kentucky Ave., Indianapolis 7, Indiana
Offices and Distributors in all Principal Cities
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

Where High Quality is Traditional

For more facts circle 559 on Reply Card

COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Unpatented Inventions

IN A SUIT against a telephone company, the inventor of an improvement for dial telephones claimed he had submitted the drawings and models of this invention to the company under an agreement that should his invention be adopted he would in return be employed by the company.

While these negotiations were pending, the company, according to this inventor, appropriated the invention which had not been patented and had been disclosed by the inventor in confidence. In this suit he asked for damages for what he claimed was the use of the improvement and an injunction against its further exploitation.

In its decision of a recent application by the telephone company to dismiss the action, the court said, "The inventor did not patent his invention and the general statement has sometimes been made that an inventor's right to his unpatented work depends on his ability to guard successfully his secret and that the property right in the idea depends upon secrecy for its very existence.

"When the idea is published without patent or copyright or a product is produced, sold and opened to examination, anyone who has the ingenuity to utilize the idea or to dissect the product and discover the secret, may make free use of it without necessity to account to its originator.

"But when the idea comes into the possession of one through special confidential disclosure by the inventor or under contractual or other legal restriction, its disclosure may be the breach of a confidential trust which the courts will restrain, and if there is a profitable use made of it the fiduciary nature of the knowledge acquired may result either in a requirement to account for damage for the invasion of a property right against one who has acquired the knowledge and misused the confidence." Petnel v. Am. Tel. & Tel. Co., 117 N.Y. S. 2d 294, New York.

Lack of Consideration

ORDER RECEIVED by a California dealer read: "Please consider this our purchase order covering 20,800 tons cold rolled SAE 1010 deep drawn prime steel sheets. Price of steel is $175 per ton f.o.b. mill."

On the same day, the dealer replied, "This is acknowledgment of your purchase order. Shipments will commence during the month of June for a twelve month period."

On that same day, the purchaser accepted an order for the sale of the same amount and quality of steel at $182 a ton. When the seller failed to deliver the steel to the California dealer, suit was brought for $145,600, profit the dealer had lost through this breach of contract in failing to deliver.

From the judgment awarding the purchaser these damages, the seller appealed, contending that the sales contract was void for lack of consideration. "The seller promised to deliver 20,800 tons of steel to the buyer and the buyer promised to pay $175 per ton for it," said the court in affirming the judgment. "These promises were the considerations moving to each by the respective parties." Beatty v. Oakland Sheet Metal Supply Co., 244 Pac. 2d 25, Cal., May 12, 1952.

Profits as Damages

WHEN A CONTRACTOR in Pennsylvania received from a tool equipment corporation an order for 92,300 sets of molded tool parts at 55 cents, it sublet the contract to a plastic molding company at 19 cents. Upon making this agreement it then accepted the order of the tool company.

However, misunderstandings occurred later and the plastic molding company sued for the price agreed upon for parts already delivered with an additional amount, which it claimed for damages for breach of contract.

In its defense, the contractor interposed a counterclaim for damages from the failure of the plastic company to make deliveries as agreed and the consequent loss of profits in its contract with the tool equipment company. In its refusal to allow such damages, the Pennsylvania court said,

"Anticipated profits on a resale are not recoverable unless in contemplation of the parties when the original contract was made. Parties when they enter into contracts may well be presumed to contemplate the ordinary and natural incidents and consequences of performance or nonperformance; but they are not supposed to know the condition of each other's affairs nor to take into consideration any existing or contemplated transactions not communicated or known, with other persons.

"Few persons would enter into contracts of any considerable extent as to subject matter or time if they should thereby incidentally assume the responsibility of carrying out or being held legally affected by other arrangements over which they have no control and the existence of which are unknown to them." Macchia v. Megow, 50 Atl. 2d 314, Pennsylvania.

Storage Charges

IT WAS PROVIDED in the purchase contract of a lathe for $7825 that, "If the above described reconditioned machine is not satisfactory mechanically, the purchaser can return it, freight prepaid within 30 days and we will refund the purchase price in full."

When the buyer returned the machine two and a half months later he was notified that unless the machine was "picked up" before a specified date storage charges of $25 a day would be imposed.

In a denial of the right to recover such charges, the Ohio court said, "There is no rule of law that one holding a machine for sale on consignment, that is as custodian, is entitled to charge storage while so held. The machine was that of the purchaser. If the seller after holding it for a reasonable time for resale did not wish to hold it upon a consignment, it was privileged to return it to the owner. This was not done. The seller had no enforceable lien for storage." Snap-Tite v. Noll Equipment Co., 134 N.E. 2d 846, Ohio, June 6, 1956.

Liability of Custodian

SEVERAL MECHANICAL devices had been invented by the owner of a machine shop on the outskirts of a South Carolina town.

He was also interested in the development of a "magnetic loom" which would operate without the noise of the ordinary weaving machines.

On several occasions he had been employed by a nearby mill owner for the repair and installation of machinery. Between the two of them an agreement was made by which the machinist was to continue his work on such a loom and furnish the necessary tools and equipment which were to be installed in a building of the mill owner, who was to provide the necessary funds for carrying on the work.

COURT DECISIONS

After several years the mill owner refused to continue with the plan or make any further advances in the development of the loom. When the machinist asked for his tools and machinery, the mill owner gave him permission to remove them but did not give him a key to the building. The tools were left in the building and a short time afterwards the mill owner died. When the machinist went to the building for his property the machinery and tools were gone and the building empty.

In an action by the machinist against the estate of the mill owner for the value of this property, the Supreme Court of that state said, in affirming a judgment in the machinist's favor,

"The mill owner, if he had desired to do so, could have terminated any liability which attached to him for the machinery by advising the machinist that he would no longer be responsible for its preservation or protection. But this was not done and having failed to do so the law imposes upon his estate the duty and obligation to show the exercise of reasonable care under the attendant circumstances. Consequently the estate must be held responsible for its value." Wilson v. Etheredge, 52 S.E. 2d 812, South Carolina, April 5, 1949.

Leased by Trade Name

CONSTRUCTION EQUIPMENT was leased to a Pennsylvania dealer under an agreement which described the property as, "A Rex Pump-Crete machine, Model 190, made by the Chain Belt Co. of Milwaukee," followed by the statement, "The lessee acknowledges that the machine and equipment have been inspected by its representative prior to delivery and have found it to be in good operating condition."

Later the machine was returned to the owner badly damaged by the lessee. Suit was brought by the owner for these damages and for the unpaid rental. In its defense, the dealer contended that the machine had been misrepresented by the owner's salesman and that it had been impliedly warranted to be fit for the purpose for which it had been leased.

"There was no implied warranty under the contract as to its fitness," asserted the court, quoting a provision of the Uniform Sales Act that is the law in that state. 'In the case of a contract to sell or a sale of a specified article under its patent or trade name, there is no implied warranty as to its fitness for any particular purpose'."

To this the court added, "The provision is equally applicable to personal property leased as to things sold. The lease identified a specific model of machine by its trade name and the name of the manufacturer. The lessee having received the machine so described in the contract is not in position to assert an implied warranty as to the fitness for the work for which it was leased." Johnson v. Waisman Brothers, 34 Atl. 2d 828, Pennsylvania.

Exemption from Negligence

UNDER A CONTRACT between an electrical contractor and an iron works in New York City, repairs were to be made on a steamship alongside the docks of the iron works. In this contract, the electrical company said:

"In consideration of this order the company agrees to save the iron works harmless from all claims for personal injuries on the part of himself or his employees while on our premises in carrying out the work called for herein, whether or not such injuries are attributable to our negligence."

An employee of the electrical contractor was injured through the negligence of the iron works. In imposing the liability for these injuries on the electrical contractor according to the terms of this agreement, the court said,

"It is a general rule of law that a person may by agreement exempt himself from his own negligence; the only requirement is that the language of the agreement must be clear and unequivocal. The agreement herein specified provided that this injured man's employer would hold the iron works harmless from all claims for personal injuries on its part or its employees . . . This is plain, clear and unambiguous language and must be given a plain meaning." Paddle v. Atlantic Basin Iron Works, 91 N.Y.S. 2d 336, New York June 2, 1949.

Uncertain Damages

CONTRACT WAS MADE by a paper plant for the erection of two turbines, to be completed by October 1st, with a provision that the seller should pay $50 a day for every day of delay in the completion of each turbine beyond the stipulated date. One was not completed until November 9th and the other four days later.

Suit was brought by the manufacturer on the ground that this stipulation was not for liquidated damages but for a penalty and so unenforceable. "We think," said the Federal Court, "that the purchaser was entitled to recover the damages fixed by the contract without making proof of any actual loss sustained by it through the failure of the seller to complete the turbines and that the seller could not defeat or reduce the recovery by proof that the purchaser sustained no actual loss.

"In view of the subject matter and the nature of the agreement and the difficulty in estimating the exact damages likely to be sustained by the purchaser in the event of a breach by the seller, it was competent for the parties to agree upon a fixed sum as liquidated damages for a breach.

"It is urged however, by the seller that when it is made to appear in an action for the breach that no actual damages have arisen notwithstanding the parties have agreed upon stipulated damages, the party in default is entitled to be relieved. On the contrary the law is that the naming of a stipulated sum in such a contract, to be paid for the nonperformance of a covenant, is conclusive upon the parties in the absence of fraud or mutual mistake." Wood v. Niagara Falls Paper Co., 121 Fed. 818, N. Y.

Damages for Delay

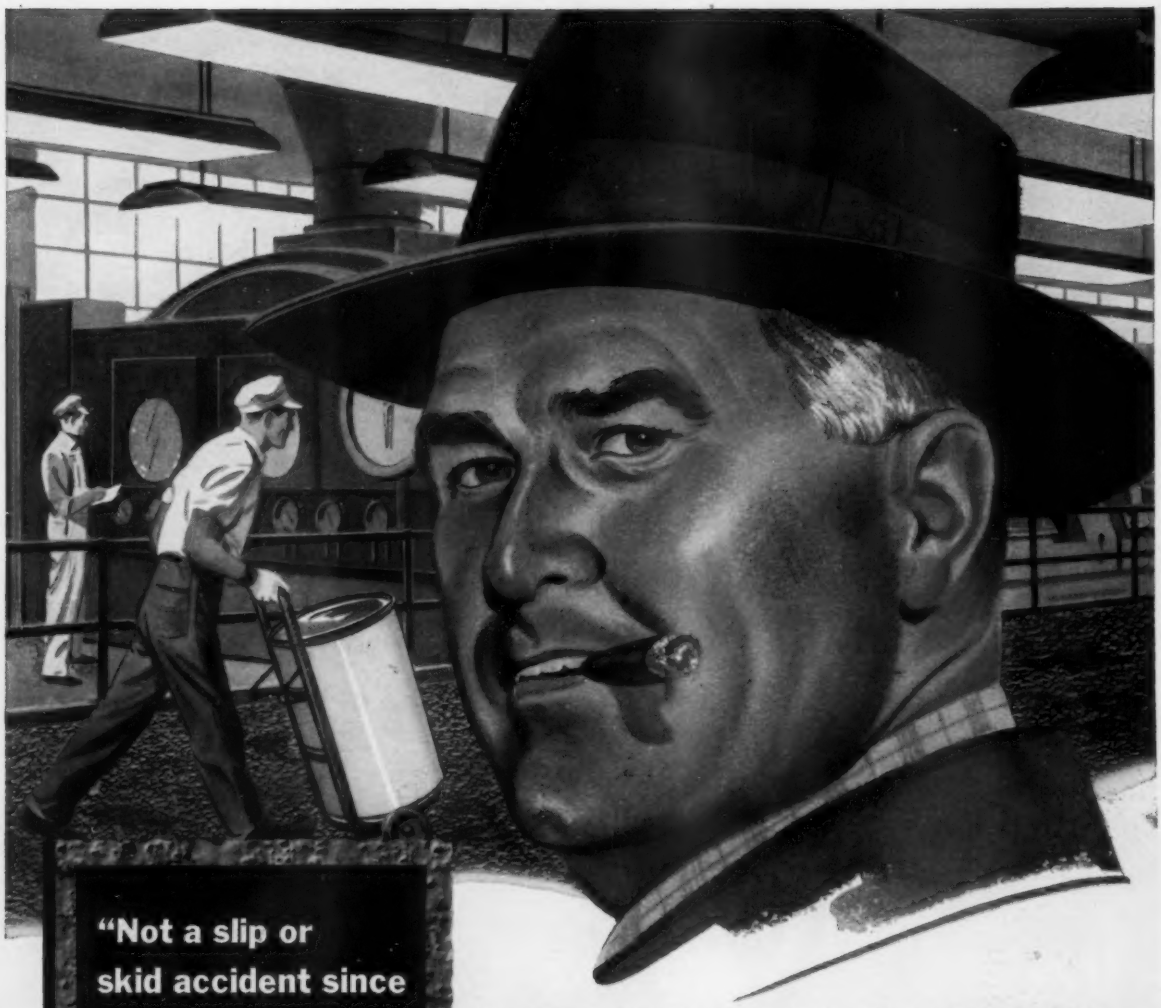
DELIVERY UNDER a contract for the manufacture of a paper making machine for $120,000 was delayed between three and four months. In a suit brought by the manufacturer for an unpaid balance of $31,215.19 the purchaser interposed a counterclaim for $16,544.55, damages it had incurred from this delay.

In its decision in favor of the manufacturer, holding such losses not damages chargeable for delay, the Federal court quoted from a former decision by Justice Holmes of the Supreme Court.

"It is true that people when contracting contemplate performance, not breach, they commonly say little or anything as to what shall happen in the latter event and the common rules have been worked out by common sense, which have established what the parties probably would have said if they had spoken about the matter.

"But a man can never be absolutely certain of performing any contract when the time of performance arrives and in many cases he obviously is taking a risk of an event which is beyond his control.

"The extent of liability in such cases is likely to be within his contemplation and whether it is or not, should be worked out on terms which it may fairly be presumed he would have assented to if they had been presented to his mind." Pusey & Jones Co. v. Combined Locks Paper Co., 255 Fed. 700, Wisconsin.



"Not a slip or skid accident since we put it in"

The ALGRIP safety story *is* a good one. This exceptional safety floor plate—the world's *only* abrasive rolled steel floor plate—provides super-safe footing under the *most hazardous* slipping conditions.

ALGRIP is made by a patented process during which grinding-wheel type abrasive particles are rolled—not coated—to a controlled depth as an integral part of tough steel plate. Usage merely exposes more abrasive particles which act as tiny, yet powerful traction grips.

Make a test installation in your worst slipping area. Use it as an overlay or as independent flooring. ALGRIP fabricates easily, requires minimum maintenance, and will pay for itself through reduction in accident and insurance rates.

A.W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP—*approved for safety by Underwriters' Laboratories*

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send me A.W. ALGRIP Booklet AL-S29

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

OTHER PRODUCTS:
A.W. SUPER-DIAMOND rolled steel floor plate—Plates—Hot and cold rolled sheet and strip—(Alloy and Special Grades)

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"On a low voltage situation, Fusetron dual-element Fuses opened and warned us of the need for a larger transformer"

HERMAN BOND, PRES.
ACME ELECTRIC CO., DENVER, COLO.

Here's Mr. Bond's own story of how Fusetron fuses helped solve the low voltage situation.

"A flock of Fusetron dual-element fuses blew one afternoon at the Duffy Bottling Works several weeks after we had completed changing the entire plant to this type of fuse in an effort to eliminate extreme heating in switches and to get more dependable protection.

"Before putting the circuits back in operation we wanted to find out what had caused the Fusetron fuses to open.

"On checking, we learned that a severe voltage drop occurred whenever the plant was in full operation. The trouble was due to the transformer being too small to keep the voltage at its normal value of 220 volts.

"To prevent the trouble recurring, a larger transformer was installed. Since then, they have had no more low voltage difficulty.

"By opening and warning of the need for a larger transformer, Fusetron fuses not only saved Duffy Bottling Works the expense of possible motor burnout, but also prevented costly slowdowns in their production."

You too, can save money throughout the plant by using Fusetron fuses . . . ***They Provide 10 Point Protection*** ***1.*** High interrupting capacity —protect against short circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes. ***2.*** Protect against needless blows caused by excessive heating—lesser resistance results in cooler operation. ***3.*** Protect against needless blows caused by harmless overloads. ***4.*** Provide thermal protection—for panels and switches against damage from heating due to poor contact. ***5.*** Protect against waste of space and money—permit use of proper size switches and panels. ***6.*** Protect motors against burnout from overloads. ***7.*** Give DOUBLE burnout protection to large motors—without extra cost. ***8.*** Protect motors against burnout due to single phasing. ***9.*** Make protection of small motors simple and inexpensive. ***10.*** Protect coils, transformers and solenoids against burnout.

DON'T RISK LOSSES! One lost motor . . . one needless shutdown . . . one destroyed switch or panel . . . one burned out solenoid . . . may cost you far more than replacing every ordinary fuse with Fusetron dual-element Fuses. *Write for Bulletin FIS.*

FOR LOADS ABOVE 600 AMPS.—USE BUSS HI-CAP FUSES to coordinate your electrical circuits.

On 600 volts or less, BUSS Hi-Cap fuses have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuits of origin. Write for Bulletin HCS.

BUSSMANN MFG. CO. (Div. of McGraw-Edison Co.)
University at Jefferson, St. Louis 7, Mo.

Play Safe! install FUSETRON dual-element FUSES and BUSS Hi-Cap FUSES throughout entire Electrical System!

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

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INDOORS AND OUT

LAMPS ARE IN SERVICE THAN

They're Job-Tailored to give you the most mercury light for your money

From Westinghouse developments like those below, you can see how the built-in quality of Westinghouse Mercury Lamps gives *more light when new, more light throughout life, as well as guaranteed long life.*

- Thorium-Coated Electrodes provide HIGHER LIGHT OUTPUT
- Molybdenum Ribbon Seals assure GREATER DEPENDABILITY, LONGER LIFE
- Hi-Temp Life-Time Bases eliminate INSTALLATION AND SERVICE BREAKAGE
- *Weather Duty® construction with special "hard" glass. Outside installations can't be harmed by snow, sleet or rain even when lamps are installed without protective coverings . . . or inside by fumes, or dripping condensation.*

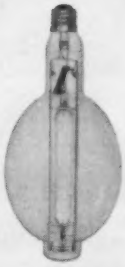
For recommendations for using the most complete line of mercury lighting—for the right kind of lamp for the job—call your nearest Westinghouse lamp supplier or write: *Westinghouse Lamp Division, Dept. E5, Bloomfield, N. J.*

B-H18: 700 W. Fluorescent-Mercury Lamp. Color-corrected Golden-White light for general purposes, flood and street lighting. A Westinghouse exclusive.

YOU CAN BE SURE...IF IT'S Westinghouse

MORE WESTINGHOUSE MERCURY ALL OTHER BRANDS COMBINED

E-H1: 400 W. Mercury Lamp. Most widely used today. For interior and street lighting. **E-H1-Y:** Built-in clear yellow filter warns of road hazards.



A-H12-WD; A-H15-WD:1,000W. Weather Duty Mercury Lamp. Recommended for all interior and exterior applications. Widely used for industrial high bay lighting. Weather proof for heavy duty service.

A-H1-WD: 400 W. Weather Duty Mercury Lamp. Recommended for general purposes, flood and street lighting. Weather proof for heavy duty service.

P-H1: 400 W. Semi-Reflector Mercury Lamp. Color-corrected Golden-White for all interior uses. Ideal for areas of high dust concentration.

C-H12-WD; B-H15-WD:1,000W. Weather Duty Fluorescent-Mercury Lamp. Color-corrected Golden-White light for general interior and floodlighting. Weather proof for heavy duty service.

J-H1: 400 W. Fluorescent-Mercury Lamp. Golden-White light is color-corrected for interior and street applications. **J-H1-Y:** Rich, yellow light to identify road hazards. Ideal substitute for sodium installations.

For more facts circle 562 on Reply Card

This AMVIT* SEWER LINE is a life line carrying industrial wastes to safe disposal

Carborundum Metals Company
Washington, West Virginia

Engineers and Builders
The H. K. Ferguson Company

This is the last time you'll see that length of pipe going into the ditch. Yet it will serve a new industrial plant for many years.

That sewer line will carry thousands of gallons of diluted acids, oils, alkali solutions and other waste material from Carborundum Metals new plant to a nearby treatment plant. Here the already diluted waste materials are made completely neutral and harmless to plant, animal and fish life. This line is one of the important life lines of that factory.

The Amvit joint was specified for this job because like the clay pipe it is unharmed by underground service.

A true mechanical joint, Amvit is made from plasticized resins of polyvinyl chloride. Thousands of feet of Amvit Jointed Clay Pipe have been installed on industrial waste disposal lines such as this.

Amvit Jointed Clay Pipe, in sizes 4" through 24", together with all fittings is available for immediate delivery in Northeast and Central States.

For more information, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.

*T. M. Registered. Patents Pending.

The Amvit Joint is made of a plastic material with rubber-like characteristics. Like the pipe, the joint will withstand the most severe underground conditions. Amvit Joint is furnished on all fittings.

SINCE 1900

AMERICAN

American Vitrified Products Company

CLEVELAND, OHIO

MANUFACTURERS of: Clay pipe, flue liners, clay liner plates and concrete pipe.

Plants Across the Nation...Brazil, Indiana • Chicago, Illinois • Cleveland, Ohio • Crawfordsville, Indiana • Detroit, Michigan • East Liverpool, Ohio Fenton, Michigan • Grand Ledge, Michigan • Lisbon, Ohio • Los Angeles, California • Milwaukee, Wisconsin • South Bend, Indiana • Uhrichsville, Ohio

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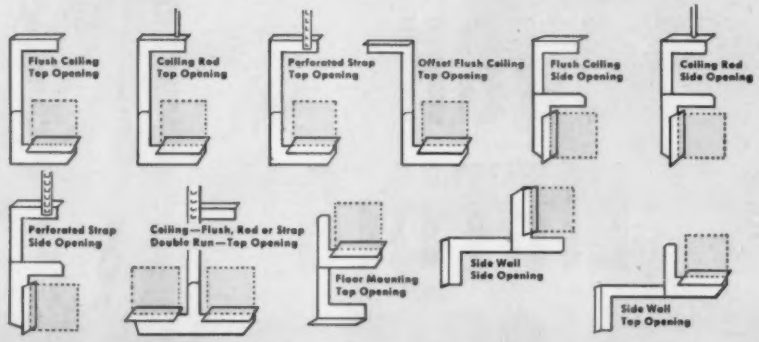
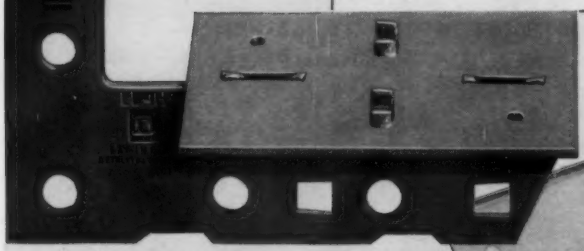
SQUARE D's NEW HANGER

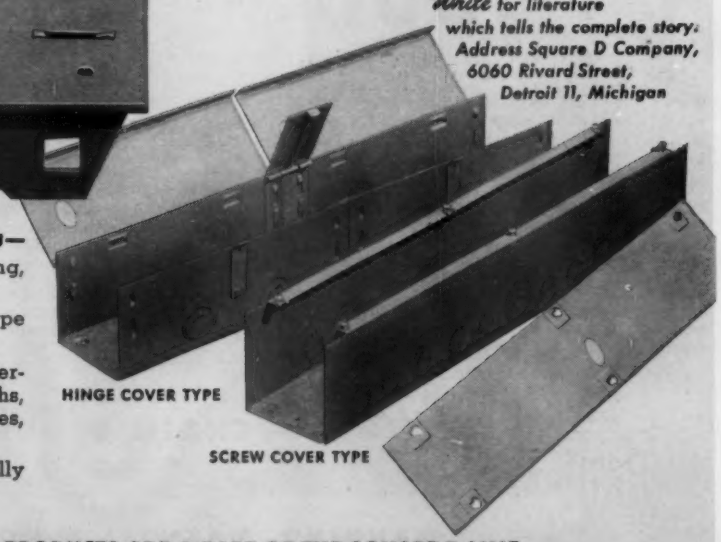
MAKES THIS LAY-IN DUCT STRONGEST— FASTEST AND EASIEST TO INSTALL!

HERE ARE 11 OF THE MORE THAN 20 WAYS YOU CAN HANG SQUARE D WIREWAYS!..


Flush Ceiling Top Opening
Ceiling Rod Top Opening
Perforated Strap Top Opening
Offset Flush Ceiling Top Opening
Flush Ceiling Side Opening
Ceiling Rod Side Opening
Perforated Strap Side Opening
Ceiling—Flush, Rod or Strap Double Run—Top Opening
Floor Mounting Top Opening
Side Wall Side Opening
Side Wall Top Opening



Write for literature which tells the complete story. Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan



Square D Lay-In Duct Gives You—

—lay-in accessibility. No wire pulling, anywhere.

—both hinge cover and screw cover type lay-in duct use same fittings.

—a *complete* line of fittings, *all* Underwriters' Laboratories approved—lengths, connectors, T's, L's, junctions, telescopes, pull boxes.

—more rigidity. New joint design actually *triples* duct strength.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY

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SHOW ME YOUR TOUGH LIFTING JOBS!

Here's the hoist to handle them in a hurry. It's the 'Budgit Aluminum Chain Block. Talk about easy pull; this hoist really has it. One man can lift a 500 lb. load with only 25 lbs. of muscle effort. The ½-ton size weighs only 29 lbs. Easy to carry anywhere a fast lift is needed.

The 'Budgit' Aluminum Chain Block takes hard knocks because super-strength is built into every part from top hook to load hook. Extra safety and efficiency is provided by the big "full jeweled" load brake. It's a fast-acting, automatic brake that makes lowering so smooth and easy loads can be "spotted" with hairline accuracy.

Put the money-saving advantages of the 'Budgit' Aluminum Chain Block to work for you. Spark-resistant models are available for use where such a safeguard is essential. Capacities: ¼ to 10 tons. *Call your nearby "Shaw-Box" Distributor for details or write us for Bulletins 405 and 415.*

I-Beam Trolleys, equipped with ball bearing wheels are available in standard and spark-resistant designs. Plain and hand geared types. Capacities to 20 tons.

Safety Hooks are available to "lock in" slings and other attachments used to support loads. All capacities.

Carrying Case. Heavy canvas riveted to sturdy base plate. Has zipper and leather handle. For 'Budgit' Aluminum Chain Blocks up to 1 ton.

57C-4

'Budgit'® CHAIN BLOCKS

MANNING, MAXWELL & MOORE, INC.
SHAW-BOX CRANE & HOIST DIVISION
362 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

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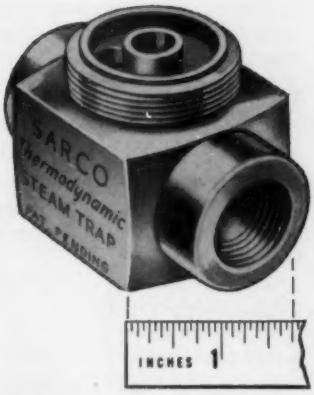
Now — A Revolutionary NEW Steam Trap!

What could be simpler?

1. A CAP

2. A DISC

3. A BODY



That's all!

Practically Eliminates Maintenance!

Look at this revolutionary new thermodynamic steam trap. Could it possibly be simpler? Look for the valve closing mechanism—there isn't any! The kinetic energy of steam closes the valve and *only* the TD uses this new operating principle.

Only 3 parts... cap, disc and body... machined from stainless steel bar stock... all extremely simple, rugged, durable. Only one moving part... a hardened SOLID stainless steel disc... practically wear-proof.

Just imagine how much time and expense this new TD steam trap can save you by greatly reducing and simplifying trap maintenance and inventory!

SOME OF MANY OTHER ADVANTAGES:

1. Use the same trap for 10-600 psi... for light or heavy loads ... without seat or valve change or other adjustments.
2. Closes tight on no load—no steam waste.
3. Operates against back pressures up to 50% of inlet pressure.
4. Not affected by superheat, water-hammer, corrosive condensate.
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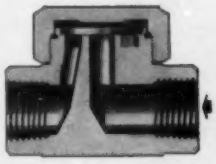

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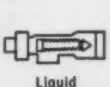
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(Advertisement)

TIPS ON TRUCKS

Increased truck efficiency, cleanliness point to "electrics"

From the standpoint of efficiency, for instance, it's important to remember that electric power is smoother; electrics are easier to inch and maneuver; electrics cost less to own, run, maintain.

And where extra-clean operation is mandatory—say, in food handling—there's little question. With electric trucks, you're never bothered by fumes, odors, or contaminating gases. By the same token, electrics won't drip oil.

The right "power package" can give performance-plus

Considering efficiency, cleanliness, safety, power costs, low downtime and maintenance costs—just to name a few advantages—the electric truck is your best bet.

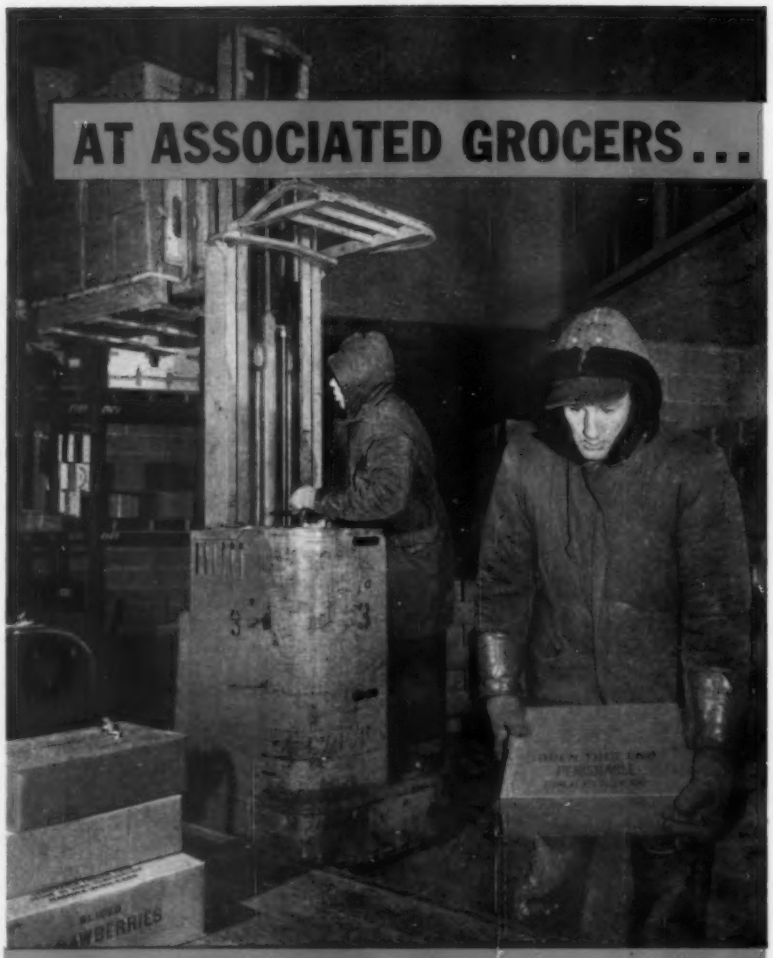
And you can get even more out of your electric truck when you equip it with a modern, advanced-design power package like the C & D *extra-capacity Slyver-Clad®* battery. In the standard-size tray, a C & D *Slyver-Clad* offers a minimum 10 percent greater capacity. In addition, C & D *Slyver-Clad* batteries are now equipped with the new Hi-Impac cell covers and containers. Truck downtime due to cell cover or container breakage is virtually eliminated. Plates are longer, heavier, designed so as to eliminate 'shedding' and prolong battery life.

(Trucks work longer . . . when they're powered by C & D Slyver-Clad batteries. For the detailed story, send for the literature offered in the advertisement at right.)

Paired for power . . .

Electric trucks . . .

and C & D *Slyver-Clad* batteries



Frozen food storage room, Associated Wholesale Grocers warehouse, Kansas City, Kansas.

Warehouse efficiency doubled;

electric trucks with C & D batteries stack stores at 10° below . . .

"Our electric fork-lift trucks and hand jacks— *powered by C & D batteries*— have increased the efficiency of the unloading and storing operation in our warehouse by 100 percent over hand methods . . . and are safer and easier to handle and cleaner to operate than gasoline-powered trucks."

This is the way Associated Wholesale Grocers sums up a top-efficiency materials handling operation since "going electric." Even working in sub-zero temperatures, advanced-design C & D *Slyver-Clad®* batteries provide the extra capacity needed to power these electric trucks throughout a full, hard-working shift.

More proof! C & D is a better battery buy!

See how advanced-design, extra-capacity C & D batteries give more work at less cost.

Write for Bulletin IT-524.

C&D BATTERIES, INC.

of Conshohocken, Pa.

SINCE 1906

Sales and service offices in principal cities from coast to coast

For more facts circle 567 on Reply Card

What's Just Ahead in This Issue?

CORROSION problems are greatly multiplied when acid fumes are prevalent. Just ask Fansteel Metallurgical. Here, hydrofluoric acid fumes are ready to pounce on any and all materials they put before it. As far as air handling is concerned, Fansteel thinks it has the answer in the plastic ductwork installed in the processing department. For information on its qualities, see "Plastic Ductwork Confines Acid Fumes" on page 116.

DO YOU KNOW how much fuses have changed over the years? Fuse development has progressed in several directions to give the plant engineer extra protection. It will pay you to review your fuse applications to determine if your plant is properly protected. To find out about these fuses and to see which types fit your needs, see page 126.

RED TAPE HAS been cut to a minimum by using red folders at Martin for emergency maintenance. When a rush call comes in for service on the line there is no dilly-dallying—red folders, TelAutograph messages too, get top attention and priority. Whether it is "service on the double" or regularly scheduled, routine maintenance, Martin handles it through a system of area maintenance controlled from a central office. How is it organized? Take a look on page 110.

IT'S NOT ALWAYS the pump that causes trouble in a pump installation—usually it's the installation, or lack of intelligence in selecting and applying the pump. Anyhow, "Pumps—and Why They Have Troubles" solves more problems than four Dorothy Dix columns. It starts on page 118.

SOMETIMES THE doctor does indulge in his own prescriptions. That's the case at Reliance Electric's new Ashtabula plant addition where, according to company officials, they "Build the Tools for Automation." Most impressive: new transfer machine for finishing motor frames; production control system; coordinated materials handling system; general overall planning of building including lighting, heating, ventilation, scrap handling. For details see article starting on page 98.

CONVEYOR CHAIN links aren't necessarily "white elephants." If you remove a conveyor and have links to spare you can put them to lots of uses. The author shows how chain links can support pipe for welding, add mobility to pipe hangers, keep heavy plant doors rolling, and even help your machinists manhandle heavy shafts in their lathers. For ways and means, see page 129.

RATHER THAN have the five completed bays of a new building at its La Grange, Illinois, plant lying idle through the winter, GM's Electro Motive Division built a temporary wall to enclose the bays, heated them and put them to use. Cost of the wall was offset by the amount of production gained. Heating system used gives up to six changes of air per hour in shops which are used for heavy welding and burning operations. For details of the wall and heating system, turn to page 142.

Fig. 1. Form is shown in assembly stage; box was made of collapsed fiberboard, slipped over paper reinforcement

They Raised the Roof

Construction Design Results in Good Fireproofing

Fig. 2. Fiberboard forms and reinforcing rods in place for concrete pouring

DURING THE CONSTRUCTION of the new plant of the Standard Tool and Manufacturing Co. in Lyndhurst, N. J., three reinforced concrete roof sections were raised into position by hydraulic jacks atop steel columns. The largest of the sections raised weighed over 1400 tons.

The waffllelike underside of the roof was produced through the use of reinforced fiberboard boxes which served as forms over which the concrete was poured, eliminating expensive wooden forms and bracing. Such method of concrete roof construction makes possible a large-span fireproof building at approximately the cost of a nonfireproof structure, according to costs calculated by Powers and Kessler, New York architects.

Advantages of this type of construction are as follows: 1. It meets stricter fire codes with relative economy. 2. It makes possible the maximum use of a plant site, considering setback restrictions. 3. It provides large spans and spacious open areas. 4. It cuts upkeep, insurance costs.

What happens when good concrete is exposed to fire? At approximately 500 to 600 F the surface cement starts to dehydrate. It will stay in place through a severe fire as it is dehydrating. Thus, a protective coating is formed, insulating the concrete interior and retarding heat transmission. The temperature on the surface may reach 1600 F while the temperature 2 in. from the coating face may not go much past 500 F in 2 to 4 hr. Tests have shown that steel under load starts to fail at 1234 F.

A big obstacle to the use of concrete in single story industrial buildings has been the cost. Wooden forms had to be put in place and then removed after the concrete was poured. As mentioned previously, this method eliminates such framework, making the cost of a one-story building competitive with an equivalent steel frame structure.

The standard New Jersey building code calls for certain setback for fire separation. Basically, this separation increases as fireproofing decreases. Because in this case the separation was diminished for reason of fireproofing, it was possible to build the new plant 10,000 sq ft larger. This gain figure is based on the size that could be built following a construction design with the next lesser rating of non-combustibility.

Clearance from floor to ceiling in the new building is over 26 ft; the ribs form recessed areas of about a foot in depth. These spaces have been used for the location of mercury lighting ballasts. Light fixtures and sprinklers are installed below the ceiling and within 20 in. of it.

Construction of this type also lowers the cost of maintenance painting. On the other hand, depending on the location of the plant and the processes, steel members should be painted every several years to protect them against corrosive action. In addition, there are savings on fire insurance premiums to be considered; it has been reported that these can be sizable.

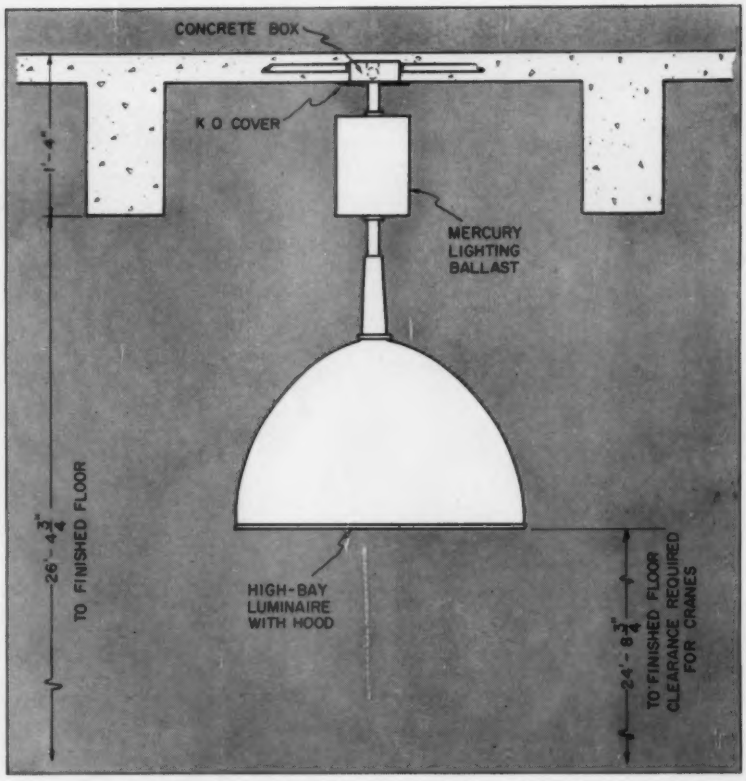


Fig. 3. Roof cross section including a typical lighting fixture installation

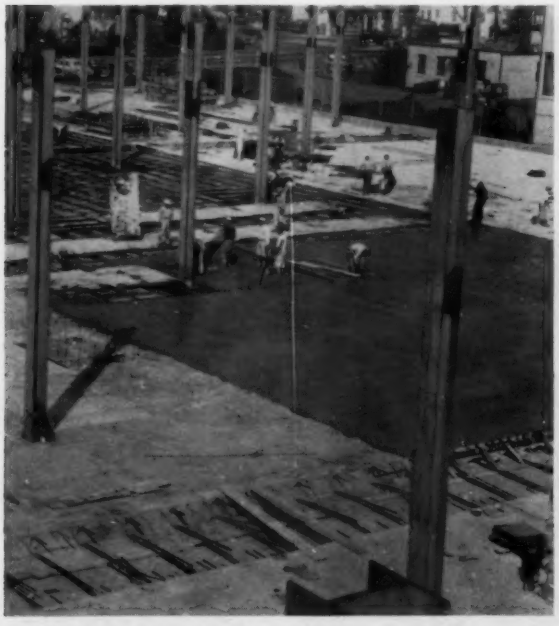


Fig. 4. Partial view of largest of three sections taking shape

Fig. 5. The recesses cut roof weight, maintain strength

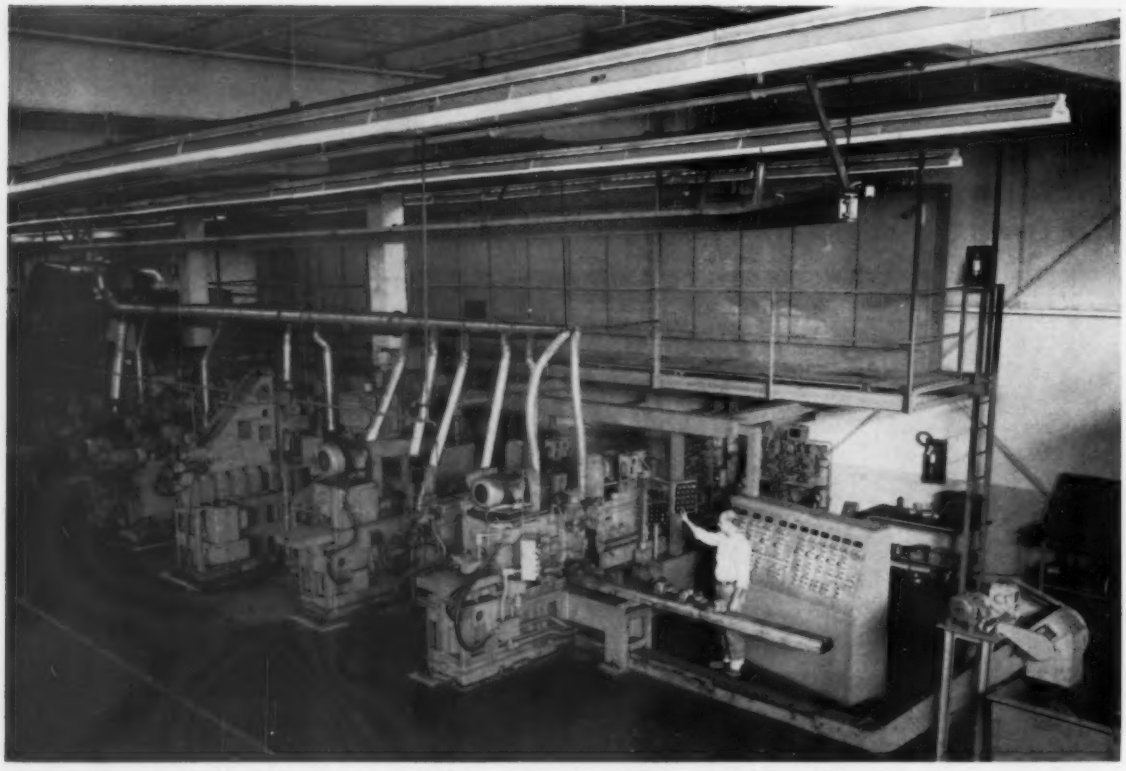


Fig. 1. This is the transfer machine for frame finishing. Control panel is at right, with control cubicles on the platform

How Reliance "Builds for Automation"

New Plant's Product Flow, Materials Handling Keyed to Low Inventory

PRODUCTION control via TelAutograph, automatic annealing furnaces and automatic transfer machine, integrated materials handling, and special assembly techniques—these are some of the outstanding features of Plant No. 3 of Reliance Electric and Engineering Co., Ashtabula, Ohio.

This plant, newest of the Company's facilities, encompasses an area of 100,000 sq ft. Of this, 6000 sq ft have been used for the modern general offices.

Beam construction was utilized in the building, even at additional cost, because of overall savings that were effected by both flexibility and accessibility for overhead handling systems. Columns are spaced on 40- by 50-ft centers as a compromise between building costs and layout of equipment and aisles. Wall construction is cement block, faced with brick. The roof is of metal decking with 1-in. insulation faced with tar and gravel.

Heating is accomplished by means of gas-fired unit heaters mounted near the roof line to save floor space, with an air-circulating system in which heat is carried directly into the building and circulated by axial-flow fans through a network of up-and-down comers. In the summer, the building can be cooled with the same equipment, using outside aid. All fresh and recirculated air is filtered. There is also automatic sprinkler protection throughout the manufacturing area.

Plant's Power Facts

To supply power, a substation was built at the north end of the building to which power is brought in at 33,000 volts, stepped down to 4160 volts, and fed to transformers within the building. Here, the centrally-located unit reduces voltage to 440 for plant use. Four bus ducts conduct the power to the various sections of the building. The duct has 600-amp capacity at the center of the building and is graduated down to 400-amp capacity near the ends of the ducts. Dry-type transformers provide spot conversion for single phase, 110-volt and 220-volt light and convenience service outlets.

Lighting for the new plant is provided by fluorescent fixtures utilizing an upward component for even light distribution. General lighting is designed for 60 foot candles and is supplemented in areas where required, such as stator and core winding inspection and testing. Coolite heat intercepting glass has been installed on the south side of the building to reduce glare.

Shorter assembly time spells shorter delivery cycles at this new plant. The shorter assembly time is a result of Reliance's concept of storing finished motor components in easy-to-reach bins adjacent to the final assembly areas, permitting a constant materials flow, as needed, and eliminating the returning of finished parts to a separate stock area.

Upon receipt of a sales order, a sufficient number of stator coils are wound to fill the order, and then delivered to a point of coordination by means of an overhead conveyor.

Simultaneously, stator cores are removed from the flow rack and in-

spected. This type of pre-inspection, company officials say, has cut costs by reducing the number of rejects at final assembly and inspection. Following inspection, the stator cores are delivered by conveyor to the coordination area. The coordinating dispatcher then assembles the core, the coils and the insulation, which is stored at this point, and forwards the entire subassembly to the core winding operation.

All jobs are processed according to a sequence number. This serves to group the frame sizes and enclosures to cut down the set-up time required on mechanical equipment.

At the Reliance plant the transfer machines produce only motor frames, but it machines a wide variety: three basic frame diameters, each with two lengths, vertical or foot-mounted, and with protected-open, totally-enclosed, or explosion-proof enclosures. This makes a total of 36 different part numbers, each requiring a different machining set-up.

This transfer machine produces about one frame per minute. To keep it out of production for more than a few hours can put a serious dent in shipping schedules. To maintain production on just one line of frames for too long a time causes needless overstocking. With a quick changeover system, Reliance is able to avoid both problems and turn what is normally a specialized machine into a very flexible machine tool.

Time required for set-up varies. Changing the same diameter frame from one length to another takes about an hour. Changeover from one enclosure to another, or from vertical to foot-mounted, also requires about one hour, while a complete change from one diameter to another consumes nine hours.

Speedy changeovers are accomplished by using special accessories. Colored spacers are used to position limit-switch dogs. The set-up man completely changes all tool positioning by removing or adding a spacer to every position. A check list is used to show the correct spacer positioning.

Each station on the machine has a pendant control for independent operation. Tooling is changed and tried, one section at a time. When all stations have been changed, one frame is sent through and is completely inspected. The set-up man then goes back and makes final inspection and adjustments. Complete frame changeovers are made in this manner in the shortest possible time and with the least amount of spoilage.

By properly cascading frame types and sizes, as few as 40 frames per lot can be economically handled on the transfer machine.

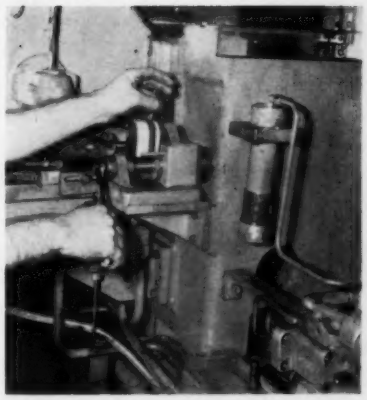
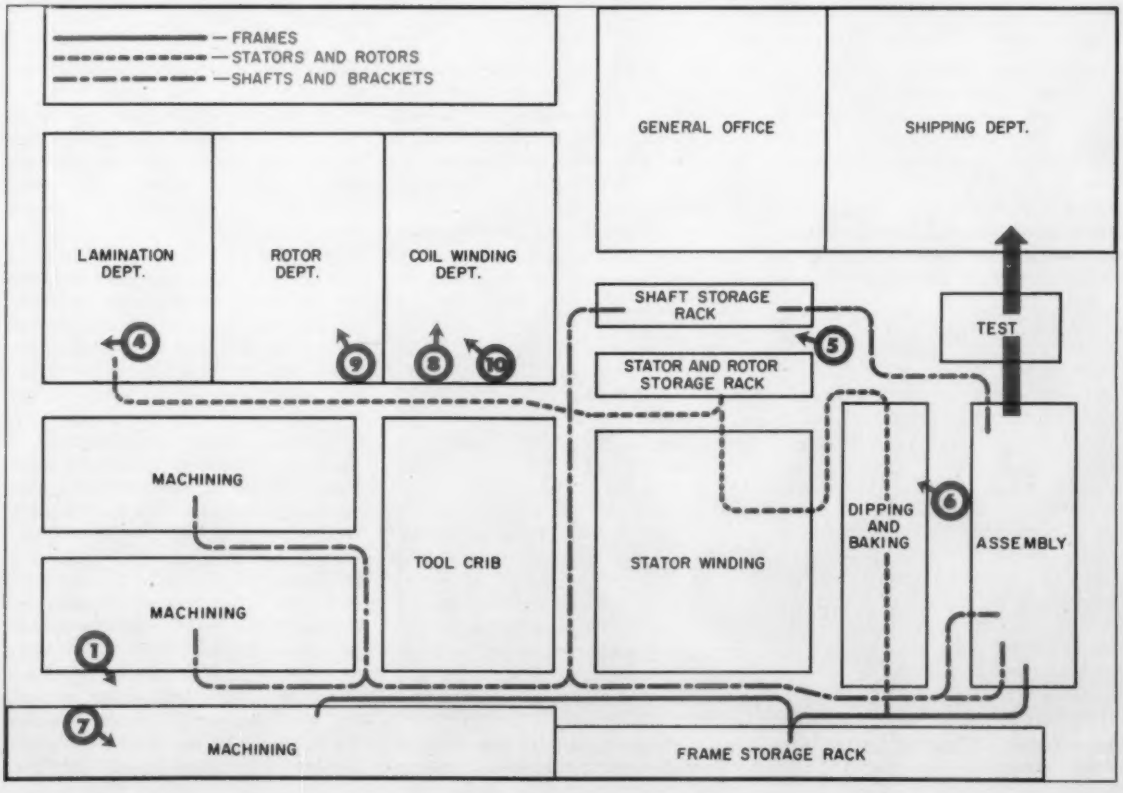


Fig. 3. Color coded dogs, or spacers, are used to set up the transfer machine. Colors of spacers tell motor frame size

The aim at Ashtabula is to keep components moving, with little intermediate storage. Because of length-of-run requirements, components produced by metalworking are directed to assembly storage. However, once a casting has started through the machining department it does not stop until all work on it is finished and the part is ready for assembly.

Hair-line coordination is not, of

Fig. 2. Plan shows location of departments with flow of parts. Numbers indicate position from which photos were taken



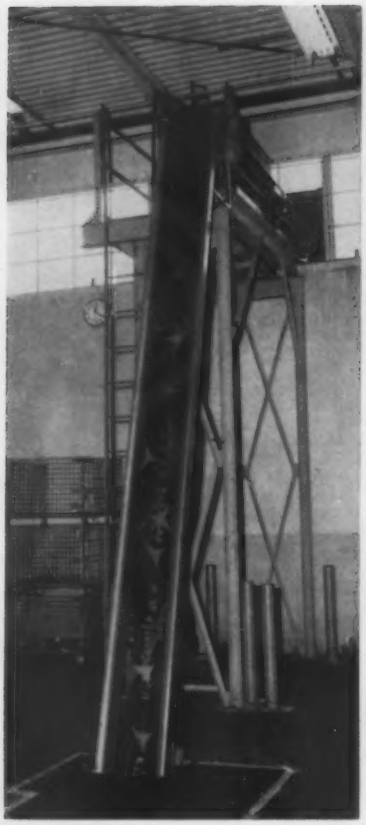


Fig. 4. Scrap from the lamination presses is carried under the floor and up magnetic belt to outside scrap bins

Fig. 5. Truck operator demonstrates method Reliance Electric uses to place these finished motor shafts in stock with the least amount of labor. The operator rides up with the lift and guides the shafts into the proper spaces in bins

course, always possible. In order to allow some slack in operation, several closed-loop conveyors are used to serve as moving storage. After the first machining operation is performed on a large frame, it is placed on an overhead conveyor. The frame continues moving in a closed circle until the next operator takes it off for the second machining operation.

More than 2060 ft of overhead monorail conveyors are installed. Each of the conveyors is powered by a Reeves variable-speed drive to match conveyor speeds to plant operation. In addition to the monorails, there is over 376 ft of roller conveyor, much of which is also powered.

To meet specialized needs, Reliance has designed some unusual equipment, like the automatic unloader for the annealing furnace. Stator cores come out of the furnace on pallets and roll down a short conveyor to a cart. As soon as the cart receives the pallet, it moves along a track toward a roller conveyor. When the cart is in position, at the conveyor, an air-actuated arm pushes the pallet off the cart, onto the conveyor. The cart then returns to the furnace.

Such devices as these have permitted the company to eliminate nonproductive man-hours. By keeping components constantly moving toward the next operation the inventory of partially completed parts is kept down to almost zero.

Even in the assembly, inspection and shipping departments, motors are constantly moving. At the end of the assembly section, motors roll into the test department. Each motor is hooked up as it moves into the area and is run-in as it moves down the conveyor to final inspection.

Perhaps the ultimate in efficient simplicity is reached in the shipping department. The conveyor line is directed past the shipping clerk's office. He reaches out the window and attaches the shipping tag and instructions, without getting up from his desk.

An important step in the production process at Ashtabula comes in annealing and conditioning the rotors and stator cores to improve their electrical characteristics before sending them to stock. In order to do this Plant No. 3 has been equipped with specially designed automatic annealing furnaces tailored to special needs and specifications.

As laminations are punched out in the stamping portion of the plant, they are split into rotor and stator groups and sent to an automatic welder where they are joined in groups to form the raw stator core.

At the welder, the loose laminations are grouped by weight and mounted on an arbor which compresses them and lines up the slots on each lamination. The arbor is then loaded onto a flip-over type carriage which allows one core to be welded while another is being loaded onto the welder.

Coil steel used for laminations is delivered without varnish. The insulating feature is provided by sending the completed raw cores through a special automatic oxidizing and annealing furnace designed for Reliance for this particular task.

As the cores proceed through the furnace under a controlled atmosphere, two things happen. First, a thin layer of tough oxide is laid evenly and completely over each lamination, providing the required insulation between laminations. At the same time, cores are annealed and stress relieved. The

Fig. 6. TelAutograph operator is shown here in the process of signalling all stations to begin assembling parts which go into the order he holds in his hands. Operators in various stations place their parts on line in the proper sequence

Fig. 7. Transfer machine operator loads frames onto transfer shuttle. Lighted panel shows if machine is functioning

annealing relieves any work hardening set up during the slot punching operation and any internal stresses at the welds.

These welded laminations, which are now cores, leave the automatic welder on special alloy pallets which are not affected by the furnace atmosphere and are fed into the oxidizing and annealing furnace. As a pallet of cores reaches the furnace charging table, it triggers a circuit in the furnace which will not allow it to enter until the preceding tray has cleared the charge vestibule and entered the furnace proper.

The furnace, which is tube fired with gas to keep combustion out of the furnace chamber, is provided with water cooling for all bearings in the heating section, both on the fan motors and the rolls. Water is also run through the rollers in cooling section of furnace to cool finished cores.

Any change in the atmosphere or temperature within the furnace, beyond the given limits, is signalled by a loud trouble bell sounding in the plant.

As a pallet of finished cores emerges from the oven, it triggers an automatic transfer table which carries it along a track to a conveyor line. At this point, an air-actuated push arm slides the pallet off the table and on down the conveyor to stock. The table then returns to furnace for next pallet.

While the stator laminations are being formed into finished cores, the rotor laminations are living an automatic story of their own as they are turned from metal rings into finished, cast rotors.

When the rotor laminations leave the stamping area, they are stacked in exact coil lengths and sent on to the foundry. Here, two specially designed die-cast presses using permanent molds and injecting molding

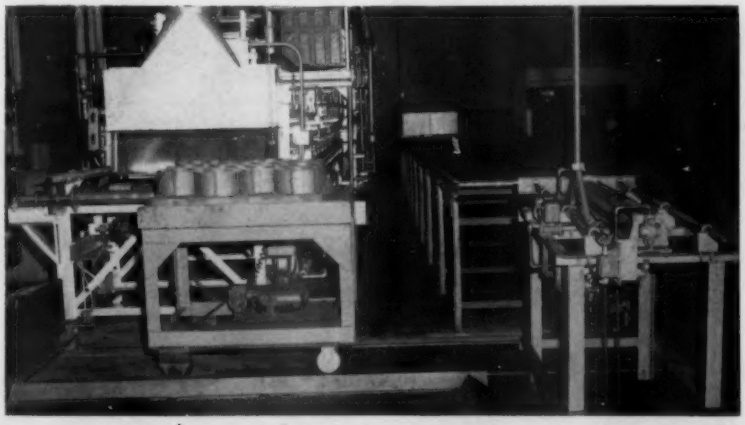


Fig. 8. Close-up of stator cores being transported from furnace to conveyor line by automatic cart. Air cylinder, right foreground, will push pallet onto conveyor line

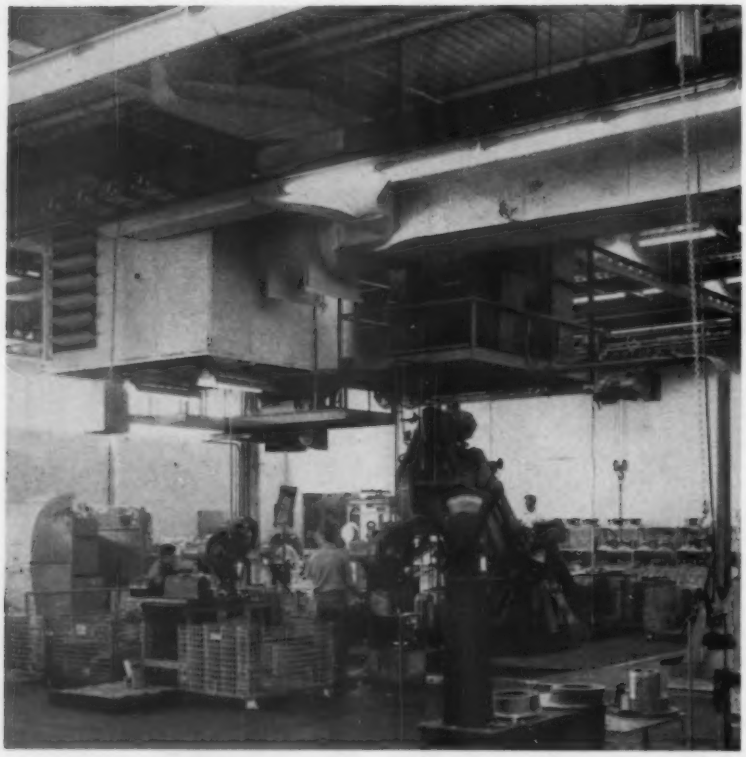


Fig. 9. Gas-fired unit heater and in-plant transformers are hung from roof to clear floor space. Secondary power is received here at 4160 v, is reduced to 440

techniques, are set to cast the stacks into rotors.

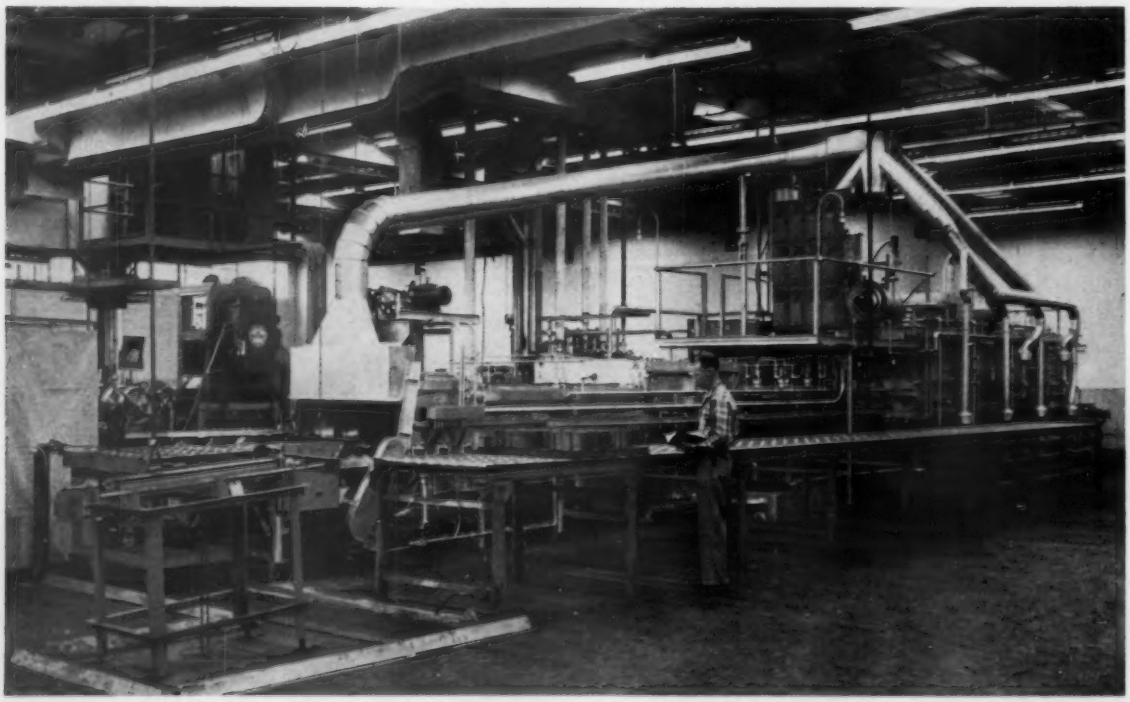
The foundryman has his choice of three different types of metal with which to cast the rotor. He may use, depending on the slip characteristics desired for the rotor, primary aluminum, Dow metal "G," or Dow metal "M." The metal is stored in closely controlled constant temperature melting pots. This is necessary since the casting temperature for the rotors is extremely critical.

The operator picks up the lamination stacks and mounts them on a keyed arbor which gives the proper skew to the slots for casting. The stacked arbor is put in the machine and another mounted while the first is casting. As the raw rotors come from the machine they are stripped from the arbor and sent to a continuous annealing furnace where they are brought to a constant temperature for approximately one hour. The temperature varies considerably with the type of metal used for the casting.

As the rotors leave the annealing furnace, they are either sent to stock or to a broaching operation where a keyway is broached, if required.

However, even in sending the completed rotors and stator cores to stock there is a story of labor saving. The finished parts are loaded onto cage-type pallets and carried by high-rider truck to the storage racks. The lift trucks are designed so that the operator goes up with the load. In this way he merely has to roll the completed rotors and stator cores off onto the storage stock shelves. Without this type of handling it would be necessary for a man to lift each part to the proper shelf.

Fig. 10. An inspector checks stator cores just received from annealing furnace. Note portion of plant's ventilation system



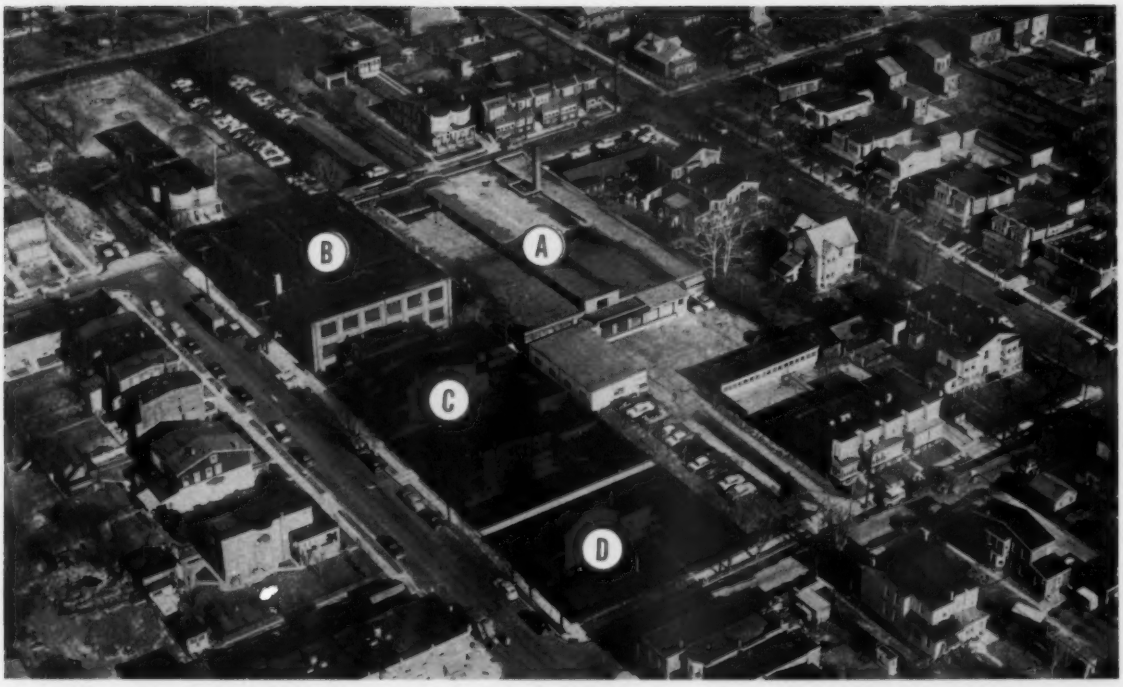


Fig. 1. A indicates Soabar's main building. B is an industrial building in which company rents some space. C and D show area of five homesites which were purchased for new addition. D section will be an employee recreation area

To Move or Not To Move

After Studying Facts, Company Decided to "Stay Put"—Here's Why

By WILLIAM F. LOTZ, JR., William F. Lotz, Inc., Philadelphia

MOVING FROM THE big city's congested traffic and limited land areas is one of today's foremost problems confronting industrialists who are considering plant expansion.

While the trend to "go suburban" has proved healthful and beneficial to many growing firms, many others have followed the exodus only to find suburban living inconvenient and filled with numerous hidden costs.

Too often, the decision to relocate is based solely on land cost and taxes. It is our experience that the decision should be made by the entire management committee, with especially strong consideration of ideas from plant engineering and production management men. The greatest pitfalls in relocating lie in hidden costs.

A study which was made recently for one of our clients shows how careful consideration of all factors—by all management departments—can change a decision to relocate. The editors of PLANT ENGINEERING, realizing that many other firms might profit from this study, have asked us to highlight the more important considerations brought to light in analyzing the move.

The Soabar Co., located in a residential-industrial area of Philadelphia, was faced for the fourth time in its corporate life with the need to expand its plant. The company looked to the suburbs where it could build a one-story plant with efficient, straight-line production flow.

However, before taking any definite steps, Soabar's management called us in, explained their problem and suggested that all possibilities be thoroughly explored. A series of conferences was held with plant engineering and production people taking an active part.

As a result of the study, five adjoining homesites were purchased, the homes razed and the necessary new addition erected adjoining the original plant.

Here are the reasons that influenced this "no-move" decision:

One of the first major problems considered was that of personnel, since experienced employees would be difficult to replace in a suburban area. A careful check of their personnel showed that the majority lived either within walking distance or a few minutes drive from the plant. To uproot and move certainly would create a serious personnel problem and additional expenses to obtain and train new employees.

Advantages and disadvantages of urban vs. suburban were weighed carefully in the study conducted for Soabar. The following suburban disadvantages were considered: lack of adequate police and organized fire fighting protection; the effect of fire protection on insurance premiums; lack of adequate water supply and sewage disposal systems; inconvenience to railroad stations, both passenger and freight; shipping and receiving problems; inconvenience to banking facilities and restaurants; often inadequate arterial and local roads.

There is no aspect of suburban location where hidden costs can wreak havoc more than in water and sewage, both in initial cost and in maintenance.

As an example, we were involved in one project where plans for a small

70,000-sq ft plant in a suburban area were abandoned when it was found that $55,000 would have to be spent for an overhead tank, a perimeter fire plug system and a second source of water storage—in this case a pond and a dam.

This firm also would have incurred an additional expenditure of $30,000 for construction of a sewage disposal system for industrial waste. This was necessitated by the number of persons employed and because the soil had a poor percolation value. In addition to the initial installation expenditures, these systems are also costly to maintain and operate (often running in excess of $10,000 per year for small plants). Whereas most suburban areas, not equipped to handle industrial waste, have a stringent sewage requirement, in most big cities waste only needs to be neutralized for acceptance.

The problem of fire protection in suburban areas is another important consideration. No matter what steps are taken to prevent fires, the danger always exists to some degree. All other factors being equal, fire insurance premiums in a No. 1 rated city will be about 15 per cent less annually than in a suburban area.

Distance from freight stations and lack of existing railroad sidings is another factor in suburban areas. However, this is admittedly of little concern to some industries. But shipping can still be a critical problem, and one which should be fully explored before uprooting.

Soabar, for example, due to the nature of its business does not depend heavily on rail transportation for receiving materials or shipping its products. Because its shipments involve a great number of small and medium-sized packages throughout the country, most shipments are by motor freight in less-than-truck-load lots.

This was one of the important considerations in deciding to "stay put." The company is presently located only five minutes drive from most of Philadelphia's major trucking terminals. They were understandably reluctant to give up this convenience for the uncertainty of fringe-area service.

Firms relying on LTL shipments had better investigate suburban trucking service before making the move—and check with users—don't rely on "fast service" promises. Many firms have found suburban tax savings eaten up by the cost of an additional truck or station wagon needed just to pick up and deliver from city truck and rail depots.

The degree to which distance from major financial institutions creates a problem will of course vary widely with individual circumstances. Except for payroll purposes, this was not a major consideration for Soabar.

Disadvantages of staying in the city were jotted down: high taxes (real estate and other), traffic congestion, air pollution (from neighboring plants as well as from the standpoint of meeting the city's anti-pollution standards) and high ground costs.

These factors were studied in light of the previously considered suburban sites for a new plant. And it was here that the real analysis had to begin. All factors considered, the company decided that the city was the best location for its operations. Following this decision, they were faced with the question: how could additional room be provided for an efficient working arrangement?

It was here that the plant engineering and production people crystallized the thinking in terms of work flow and possible physical layouts in relation to production efficiency. It would not be possible to adopt their original plan of one-floor layout. From conferences and work studies, it was determined that a two-story addition to the present plant could provide all the needed facilities.

Owners of five homesites adjoining the plant were asked if they would be willing to sell their homes. Each owner indicated a willingness to sell at a reasonable figure. However, before completing the transactions, company employees and executives made personal calls on all neighbors, told them what they wanted to do (even showing them color sketches of the proposed addition) and asked these residents how they felt about the expansion plan. All homeowners in the area appreciated this courtesy and the company received a 100 per cent vote of confidence.

The properties were purchased, the homes razed, plans drawn for the addition (allowing room for future expansion on the new ground) and the work was begun. The job was planned so that time could be saved by moving departments into the new building as the various sections were completed. Overall costs for the entire job were far below what it would have cost to uproot and build a new plant.

However, no one rule can apply to everyone. Each firm will have to weigh all the facts concerning its own

(Continued on page 258)

Fig. 2. J. M. Kyte, Soabar president, discusses relative merits of various sites with, l to r: W. P. Schurr and D. L. Tamaccio of the plant engineering staff, W. M. Henry, executive vice president, and J. J. and W. F. Lotz, Jr., builders

Fig. 3. A few weeks before this picture was taken, five homes stood where this new two-story building is now

Fig. 1. Left, the handle goes through the opening before the material is placed over the bristles

Fig. 2. Above, universal joint between the handle and brush helps in cleaning under furniture

Treated Cloth Is an Ekco Maintenance Treat

A SPECIALLY-TREATED cloth is cutting the cost, and improving the efficiency, of housekeeping operations for Ekco Products Co., a large housewares manufacturing firm located in Chicago, Ill.

This recent innovation in plant maintenance operations consists of a relatively coarse, open-weave fabric. It is impregnated with a special compound which enables it to pick up and hold the loose soil encountered on the surfaces cleaned.

One of the two cloth sizes is a yard square, and is draped over the bristles of a specially-designed cleaning tool for use on floors and wall surfaces. The other cloth size is approximately 18 x 30 in. and is used for hand dusting of office furniture, window sills, and similar work.

The cleaning tool used with the larger cloth consists of a brush-head measuring 20 x 5 in. mounted at the end of a standard mop handle. There is a hole in the center of the cloth through which the handle passes. A universal joint gives the brush sweeping flexibility.

It has been reported that floor maintenance has benefited the most from use of Kex cloths at Ekco. The labor required for the daily sweeping has been reduced, and the investment in brooms and other supplies has been cut sharply. In addition, floors require fewer wet moppings than formerly.

Before treated cloths were introduced, linoleum tile-covered floors were cleaned with a sweeping compound and push brooms. Brooms with 18 in. heads were used for this chore. The labor force totaled six men. They had some 42,000 sq ft of floor area to cover, comprised mostly of office space, but also including a lobby heavily used by employees entering and leaving the plant.

Today, thanks to these cloths, five men are handling the same job, according to George Lorang, janitor foreman. Big reason for the labor saving, he explains, is that using the cloth mounted on the special tool, each worker can clean a wider swath of floor. While walking from one end of the room to the other, he moves the cloth-covered brush from side to side, and covers an area approximately 10 ft wide.

Sweeping Path

When push brooms were used, the sweeping path was less than half as wide. Also, the need to spread compound before commencing the job further reduced efficiency.

Under the former system, the tile floors had to be wet-mopped once a week because the daily sweeping operation did not remove all the soil. The treated cloths have been doing such a good job, however, that Ekco now wet-mops only once a month.

Previous to the use of the present method, areas under desks, chairs and tables seldom received sufficient attention from sweepers. To get at these spots required a great deal of physical exertion that has been eliminated by the universal joint.

Reducing the size of the daily sweeping crew from six men to five, and cutting the number of monthly wet moppings from four to one, has produced a reduction in labor cost amounting to about 20 per cent.

Formerly, a new supply of the brooms required for the daily sweepdown had to be ordered about every two months. Now, new brooms are purchased only twice a year.

Sweeping compound, previously used in both office and shop areas, is now required only on the latter floors. As a result, much less compound is required per month.

Wet mop life has been increased approximately 50 per cent because the mops are not used as often. The cost of detergent has also been reduced for the same reason.

Walls are cleaned approximately every three months. Formerly, dust mops were used for this chore. One weakness of the mop was that it removed less soil than the cloths are able to pick up. Another was that plant personnel had to wash the mops at frequent intervals.

When rags were employed, it was necessary to polish office furniture, as a separate operation, every six months. The rags kicked up a lot of dust when applied to a furniture surface; later the dust settled and reduced the quality of the cleaning job. With the cloths, this problem of airborne dust has been reduced sharply.

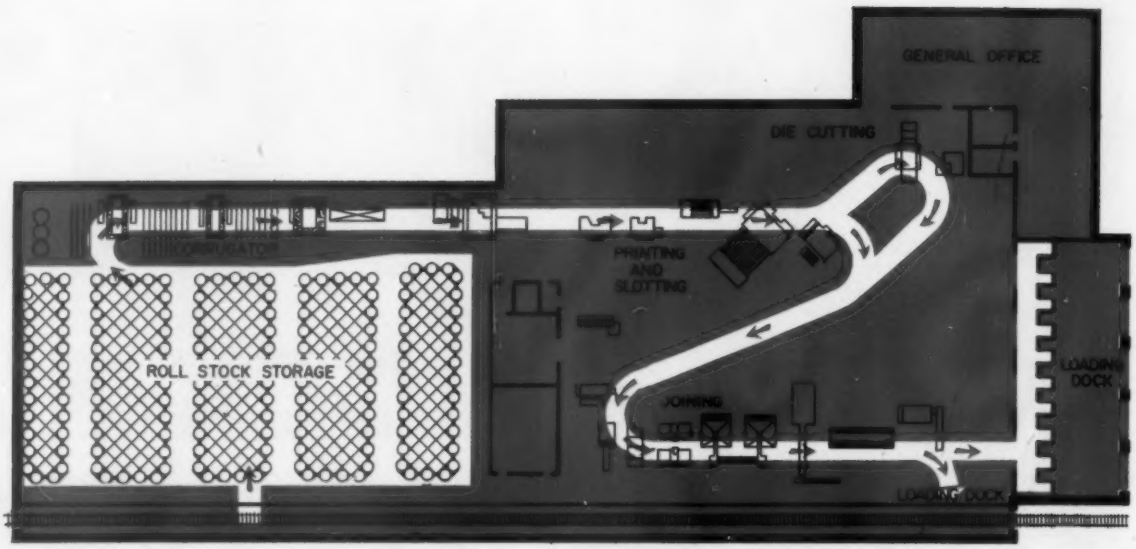


Fig. 1. Floor plan of Hoerner's plant. Arrows indicate material flow. Unique angular roll storage is illustrated

Hoerner Gets Designed-in Efficiency Two Ways

1. Materials Handling Ideas 2. Compact, Economical Steam Plant

HAND-LIKE handling devices, "on-the-bias" storage areas, and a centrally-located steam generating plant are just a few features of the newest facility of Hoerner Boxes, Inc., Minneapolis. Built for the manufacture of the company's line of corrugated shipping cartons, this 147,000-sq ft plant incorporates ideas and practices that result in maximum production with a minimum of materials handling.

These time-saving and cost-saving practices begin with the receipt of the rolls of kraft paper that are the raw material of the operation—in rail cars that roll into the plant on a completely enclosed, 12-car siding, or in highway trailers that are unloaded at one of 10 loading stations in Hoerner's enclosed truck dock.

For unloading rolls of paper, that weigh up to 5000 lb, a Bartell load grab is available for mounting on one of the fork lift trucks in the plant. This grab picks up the paper rolls, which are stacked on end in the rail car, by squeezing them between a pin inserted in the top core and a clamp which is hydraulically forced against the outside of the roll. The action of the clamp is analogous to the human hand —the rolls of paper are picked up in the same manner in which a roll of paper towels is picked up with the thumb in the core at the top and the fingers squeezing one side of the roll in toward the center.

A conventional roll grab is also used at the unloading dock, to remove rolls from the cars and to stack them in the storage area. Here, a procedure is used that saves space and truck time in stacking and unstacking paper rolls. The storage area is laid out "on the bias" and rows of rolls, stacked on end, are laid out on an angle to the dock.

This arrangement permits easier access to the storage piles for the trucks, and thus speeds up both storage and

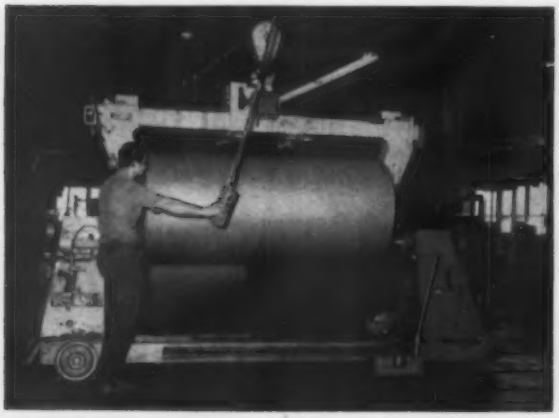


Fig. 2. At corrugator, roll grab lifts roll to place it in roll stand which moves into machine to feed paper

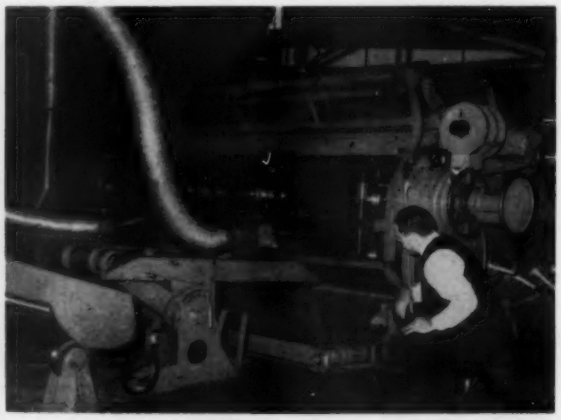


Fig. 3. Plant Superintendent M. L. Hutchinson inspects trim conveyor and suction line outlet for removal of box trim

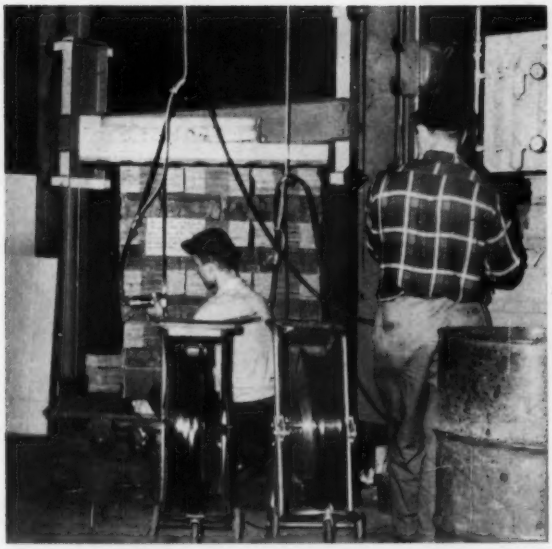


Fig. 4. Hydraulically-powered ram compresses pallet load of cartons for steel strapping prior to loading for shipment

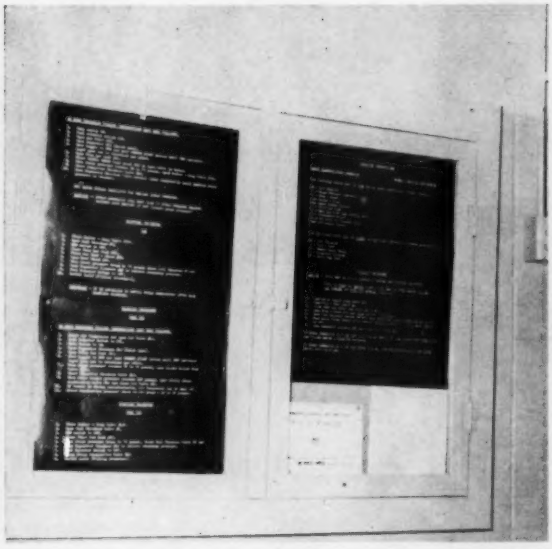


Fig. 5. Photostated and enlarged, operating instructions for steam generators are mounted on boiler room wall

removal of the rolls, while cutting aisle width from 16 ft to 10 ft. In most cases, the rolls are stacked from the dock end of the storage area, and are unstacked from the corrugating machine end. The general arrangement is shown in Fig. 1.

At the corrugator, materials handling devices "gang up" on each roll. As the lift truck brings a roll from storage, the holding clamp rotates to turn the roll into horizontal position, and it is set down on the plant floor. Here, a roll clamp, suspended from an overhead crane, comes into use, clamping the roll from each end, to pick it up.

Secured in the clamp, the roll is carried to the area adjacent to the corrugator feed, for installation in the machine. The roll stands of the machine are mounted on dollies which roll on rails set in the floor, at right angles to the machine centerline. A roll stand is moved out into the loading area to clear the machine, as shown in Fig. 2, and the roll is lowered into place between the centers on the stand. From here, the roll stand is rolled back into the machine feed area so that the paper may be fed into the machine for corrugation.

As the paper is corrugated and formed into board, trim and waste is created that must be removed from the machine area. Here, too, materials handling enters into the picture to provide efficiency and low cost. From a centrally-located collection station, made up of cyclone collectors, tubes lead out to various machines in the plant. Suction in these tubes carries the paper trim and cut-off scraps from box-making machines, to the collectors. These collectors are mounted directly above the baling room in the plant. Their discharge of trim and waste is dropped into the baler, where it is compressed and tied, to be sold as scrap.

At some of the machines, the suction lines are supplemented by conveyors at floor level. One such installation is shown in Fig. 3. Here, cuttings from the box forms are carried by conveyor to one side of the machine, where they can be funneled into one of the suction tubes, or picked up manually and carted to the baling room.

To complete the roughly U-shaped flow pattern of materials in the plant, finished boxes are shipped from the same docks on which the raw material, paper, was received. The same lift trucks, with the special handling devices removed, are used to load finished boxes, palletized, into rail cars and highway trailers for delivery to distribution points or user plants.

At one point in the palletization process, finished boxes are given a "squeeze" hydraulically, to compress each pallet load to minimum size for shipping. Specially built for Hoerner, a hydraulic press, Fig. 4, compresses pallet loads of folded boxes so that metal strapping can be secured around the load.

The building itself, incorporates features that add to its usefulness. A one-story structure, it has three roof levels —over the office area, over the paper storage and corrugating areas, and over the converting and shipping areas.

In the storage area, where space is at a premium, the ceiling joists are 22 ft from the floor, to allow maximum height for storing rolls of paper. In the converting areas, where this height is not essential, the joists are 16 ft above the floor, and in the office area, the roof level is dropped lower.

An interesting sidelight of the roof construction is the use of different materials in different sections. Over the corrugating area, where moisture content in the air is particularly high, the roof consists of light-weight poured concrete slabs laid on the joists, with built-up roofing laid on top of the slabs. Over the converting area, where moisture conditions are not so severe, steel roof deck has been laid on the joists, with built-up roofing complet-

Fig. 6. With steam a prime production factor, close attention is given to steam trap efficiency. Here, engineer uses "stethoscope" to check for trap action

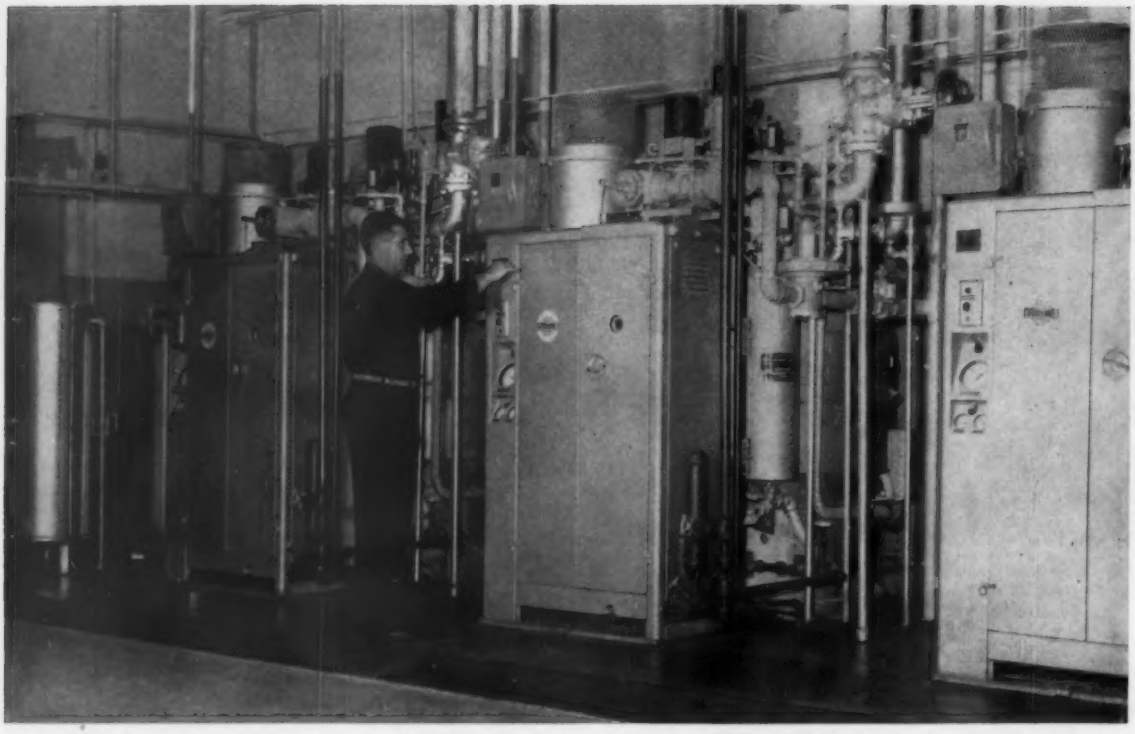


Fig. 7. Boiler plant consists of these three steam generators. Two tanks at left are used to treat feed water

ing the installation. The use of the concrete slabs over the corrugating area is designed to combat the corrosive effects of the moisture concentrated in the corrugating area.

Minnesota's typically cold winters posed a problem in heating the plant. Contributing to the problem was the large demand for steam for processing the paper—heating and moistening it for better performance in the fluting rolls, and drying it, after it has been formed into board. The steam is also used to make, and keep hot during application, the glue used in the manufacture of corrugated board.

Plant heating is provided through 23 unit heaters, which are supplied with steam from the same source as that which provides steam for processing.

Total demand for processing and plant heating steam is estimated at 10,000 lb per hour, in winter operation.

Source of the entire steam supply is a unique "boiler room" in the center of the plant housing three 5000-lb per hour Vapor-Clarkson steam generators. Unlike most boiler houses, this one, which is 30 ft long by 40 ft in size, is neat and uncluttered, painted in pastel shades. The three steam generating units are lined up along one wall, with zeolite water-treating equipment at the end of the line. See Fig. 7. A 15-ft high steel platform supports the condensate return tank and a feed water tank, to supply water to the steam generators. Space under the tank platform is utilized for storage of water treating chemicals.

With each of the Vapor-Clarkson generators capable of supplying 5000 lbs of steam per hour, at 175 lb pressure, two of the units are sufficient for operating and heating the plant under winter operating conditions. In the summer, one of the generators is capable of supplying the steam required for the process, so at all times, winter or summer, there is at least one generator on standby.

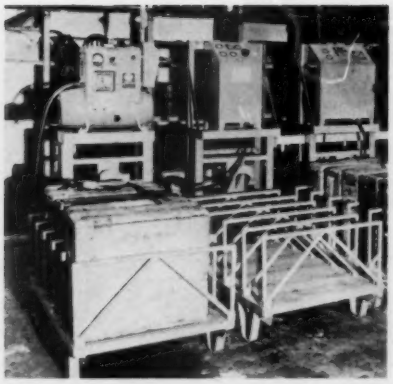
Fig. 8. Lube barrel at right is "pressure tank" for system. Compressed air piped into top of drum forces oil at 10 psi into lube lines of corrugator

Dual-fuel burners on the generators permit almost instantaneous switching from city gas to fuel oil. The gas, at one pound pressure, is the fuel ordinarily used, but in the event of supply failure, the operator can change fuels by flipping one switch and opening one valve to begin burning oil stored in a 10,000-gal underground tank.

Controls on the generators keep them cycling on and off, as steam usage on the corrugator changes.

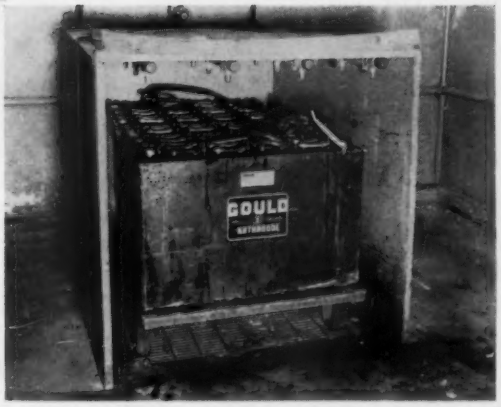
Traps on the corrugator and heaters return condensate to the surge tank located in the boiler room. The surge tank is vented through the roof of the building. This closed circuit to the elevated tanks brings condensate back to a point where it can be mixed with make-up water as necessary, and gravity-fed into the positive displacement feedwater pumps in the steam generating units.

These generators are a single phase —but an important one—of the many features of the new plant that are contributing to the successful production of corrugated board at a rate of 450 fpm, and to the economical conversion of this board into boxes.



Skids with welded partitions simplify handling and servicing of six-cell batteries

Above: Battery service gets a lift from these ideas: portable skid-mounted drum and metal saddles, right background. Right: Special cabinet was designed by plant personnel for washing batteries



Helpful Ideas Improve Battery Servicing At Western Electric

BATTERY POWERED industrial trucks form the backbone of materials handling at the Indianapolis Works of Western Electric Co. A fleet of 55 rider-type and 58 powered hand trucks work two shifts to keep telephone equipment of all kinds moving on schedule.

In operation, here is how the materials handling equipment is handled at this plant. After a job is surveyed, the materials handling equipment is specified by the plant engineering department. Following this, the daily supervision and dispatching of the trucks are the responsibility of the production department in which the trucks are assigned. The maintenance department takes over when it comes to servicing this equipment.

These Ideas Made Job Easier

Personnel at this plant have come up with several interesting ideas to help simplify the task of servicing industrial truck batteries. In one instance, they have devised special metal saddles which are attached to the unit that supports the motor generator sets. Two motor-generator sets are used in the central servicing area where the rider-type and some walkie batteries are charged. The cable leads used for connecting the batteries to the feeders are hung on these metal saddles.

Another helpful idea is the skid which was designed to hold five 6-cell batteries while on charge. The skid has a metal plate to which partitions are welded to separate the batteries and hold them in position during movement to and from the charging station. The skid is painted with an acid-resistant paint.

Battery servicing is further simplified by the design of a special washing cabinet. The cabinet is fully enclosed with a canvas flap over the front. Water at plant line pressure is directed over the top of the battery by 16 nozzles arranged in four rows of four each. Batteries are placed on a skid, moved into the cabinet, flap is closed and the water is turned on. After the required period, the water is turned off and the battery is allowed to drain and dry in the cabinet.

Strict adherence to maintenance routines is carried out on all batteries in the remotely-based trucks. Once a week all six-cell batteries are checked for electrolyte level and filled, if needed, from a portable unit transported on a skid.

This portable unit, also devised at the plant, consists of a 50-gal drum made of nonferrous metal filled with water approved for battery use. It is equipped with a small pump and motor which can be operated from the battery itself by placing clips on the battery terminals. A hydrometer for checking the specific gravity of the cells is also carried on the skid-mounted unit.

Plant Services 151 Batteries

A total of 151 batteries are serviced at this plant. Of this total, 68 are 15-cell batteries for the 55 rider-type trucks, and 83 are six-cell batteries for the 58 powered hand trucks.

For smooth, efficient operation, the trucks are assigned to specific areas for handling routine, repetitive loads. To handle non-routine or priority moves, eight of the rider-type trucks are equipped with radios for quick dispatching. In some cases, special equipment is used. Trucks assigned to the loading docks have low masts to permit entry all the way into the highway trailers and trucks.

Maintenance at Martin

System Cuts Red Tape, Gets Work Done

By **GEORGE T. NEMPHOS**, Supervisor, Maintenance Planning and Scheduling
Glenn L. Martin Co., Baltimore, Md.

THE MODERN industrial plant is a vast system of men and machinery. To attempt to run such a plant in a haphazard fashion is to invite disaster. Every man has his job; every machine has its function. Manufacturing contracts are carefully planned, scheduled and co-ordinated so that the utmost efficiency of plant facilities is obtained. A breakdown anywhere along the line, like the weakest link in a chain, can disrupt the entire schedule.

To avoid this eventuality, Martin has organized its maintenance system in such manner that loss from breakdown is held at a minimum. That the system works has been proven by higher production schedules.

There are, at the company, five basic types of maintenance employed to carry out the activities of the maintenance program of the Plant Engineering department. Each type is planned to perform a specific service needed to maintain the plant at the peak of operating efficiency.

There is, first of all, routine work, in which all the activities are planned and scheduled. Standing work orders and procedures have been established for each section, and the work scheduled is done daily, weekly, or monthly as called for by the order.

Periodic maintenance inspection is also done following a definite schedule. All machinery and equipment is checked and serviced periodically in order to minimize breakdowns and unnecessary delays in production.

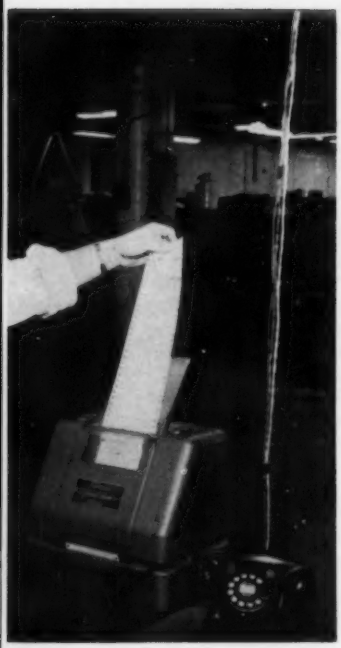
Schedule for these periodic checks chronologically lists all equipment currently in operation, including a description of the type of work done, the frequency of work and other information helpful in making these performance checks. The frequency will, of course, vary with the type of equipment being checked, its usage and the manufacturer's recommendations.

Estimated hours required to make checks, adjustments and minor repairs are also noted on the schedule. This information is used to determine the manpower requirements for future checks. Space is provided on the schedule form so that the repair man can describe the conditions of the machine and the adjustments made.

All service requests, when called in by an authorized departmental supervisor, are accepted by a switchboard operator and, in the case of an emergency, a crew is rushed to the site immediately.

Machine tools and equipment are scheduled for overhaul by a periodic physical survey to determine their repair needs. Priority overhaul is given to that equipment which is in the poorest mechanical condition, and is coordinated with the production machine loading section.

All emergency repair work is given a top priority classification so that ma-



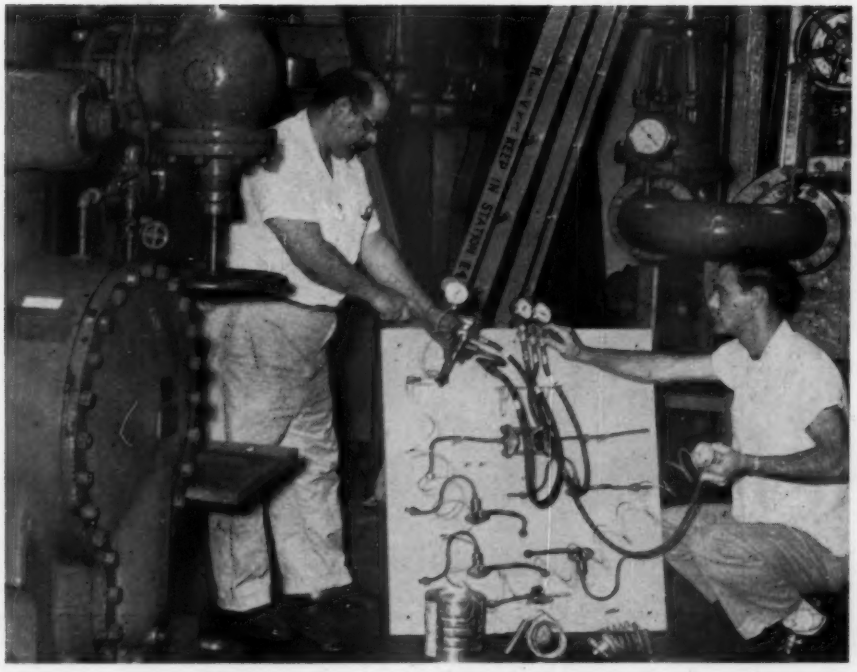


Fig. 1. (Far left) Operator in the central maintenance office receives request for service by telephone, simultaneously recording it on the TelAutograph

Fig. 2. (Center) In outlying maintenance office, foreman receives service request by TelAutograph, dispatches work crew to trouble spot in matter of minutes

Fig. 3. (Above) Within a few minutes of request being telephoned, work is in progress; in this case it is repair and testing of air conditioning equipment

chine breakdowns are repaired quickly, resulting in a minimum delay in production.

The Planning and Scheduling Group in the Maintenance Department picks up all work orders that must be filled by the department. There are two channels through which Maintenance receives orders. The first is from the Plant Engineering Group, which sends work to the Planning and Scheduling Group in a folder. This folder contains prints of the job together with its instructions. A starting and completion date are put on each folder to insure proper working sequence for the job.

If a job must be done immediately, the folder containing the work order will be red; all other orders will be received in a manila folder. In the instruction portion of the folder, time is given each job so that the weekly work load may be determined.

The second channel through which the Maintenance Department receives orders is by telephone from supervisors all over the plant. These items are usually emergency or rush items. If a short circuit occurs in an electrical line or if a pipe suddenly springs a leak, the complaint is immediately reported via telephone by a supervisor.

When the department switchboard operator answers the phone, the complaint is written on a TelAutograph machine, simultaneously registering on a monitor in the office of a maintenance outlying group, one of which is located in each building. The service ticket is then removed from the machine in the outlying group, and the supervisor of the group assigns the job to an electrician, plumber, carpenter, or to a man of whatever skill is required to do the job. Job is thus being worked in a matter of minutes.

Regularity is obtained wherever possible in working jobs, which brings to light the Martin Preventive Maintenance Program. The best way to explain preventive maintenance is by the old proverb, "A stitch in time saves nine."

Preventive maintenance starts in the Planning and Scheduling Group where each piece of equipment is registered on a schedule sheet. This sheet is then marked for frequency of check on the work to be done. It may be once a week, twice a week, or any time frequency that is required.

On this same sheet there appears a list of the operations that will be done, where the job is to be worked. Each one of these schedule sheets has been time-studied, and the hours needed to do the job are written on the sheets to establish the working efficiency of the job. The idea behind the frequency check is to find the trouble spot before the breakdown occurs. Thousands of preventive maintenance schedules are in use, affecting various groups.

To follow through on these sched-

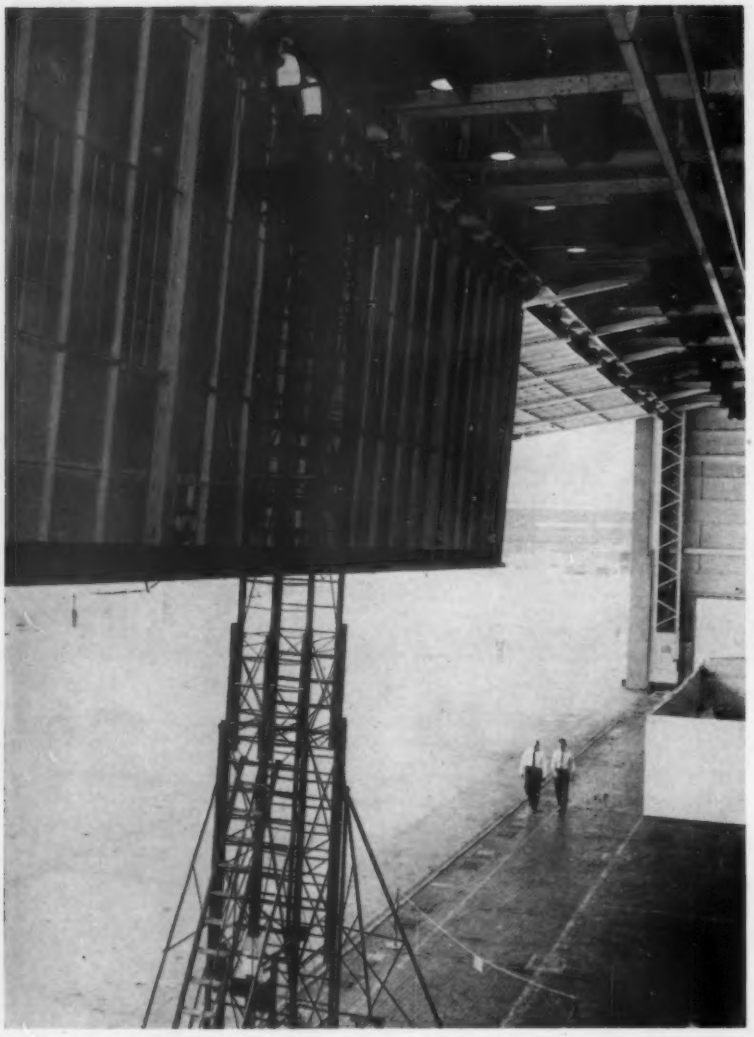


Fig. 4. All in day's work of maintenance men is job of balancing 12-ton door

ules, a weekly meeting is held with each group to answer for the completion of each schedule sheet. The Machine Repair Group for all machinery in the plant; the Heating and Ventilating Group answers for air conditioning and heating equipment; the Building and Field Group answers for all schedules on buildings and grounds; the Sanitation Group answers for schedules on cleaning and trash disposal; and the Construction Group answers for construction items. Any incompleted schedules are reviewed by the superintendent.

The Maintenance Department is assigned a representative from the timekeeping department. All hours worked in the maintenance area are recorded by this representative. To keep an accurate check on the amount of manpower consumed, a separate code number is given to each group by the timekeeper. Every day the Supervisor of each group carries his time sheets to the timekeeper; these sheets contain the amount of time for each person working under a particular code number.

Figures are compiled each week by the time-study group to determine how many hours are charged against each supervisor's group. When the total figure is compiled, it is then compared with the amount of work accomplished on the preventive maintenance schedules. Since each item on the schedule sheet has a time value, if a supervisor has 1000 hours registered with timekeeping for one week and he accomplishes 1000 hours of credits from items worked during that week, his effectiveness is 100 per cent. On the other hand, if his effectiveness is below 90 per cent, he must do something to improve that mark.

Each week an effectiveness report is published in the Maintenance Department showing the effectiveness of each supervisor. This report is reviewed during a weekly meeting and appropriate action taken by the superintendent.

Red tape in the Maintenance Department has, literally speaking, disappeared. After all, if a water pipe breaks, red tape will not stop the leak. A plumber with a pipe wrench is needed, but quick. If the item is worth reporting to the Maintenance Department, it feels the work is worth its immediate attention.

The maintenance structure is divided into five sections, each having its base operations in the maintenance shop but with other advantageous locations maintained in the plant areas, and each controlled by a general foreman or line supervisor.

Planning and Material Control. The work of this section is primarily administrative. Its principal duty is to plan and schedule maintenance functions of all groups, including building and equipment painting, preventive maintenance and Plant Engineering Department construction. It verifies manpower requirements and drafts requisitions for necessary personnel.

It is responsible for keeping accurate maintenance operations records, co-ordinating preventive maintenance schedules, and expediting procurement of parts and materials for the maintenance operations. The group is also in charge of the dispatch and control of department vehicles, and the library of descriptive literature, brochures and catalogues needed to

Fig. 5. Time clocks receive a check-up

maintain and operate the plant facilities and equipment.

Mechanical Maintenance and Service. This group is divided into three sections. The mechanical maintenance section services, maintains and repairs all the machine tools and equipment in the buildings. It repairs the small tools which are received daily from the main tool crib. It services electric motors, time clocks and auto calls. It repairs and services locks, and makes keys converting the standard file cabinets to meet security regulations and checking duplicate key requests with the Personnel Department to see that security regulations are not broken.

It makes physical tests on the gages, instruments and controls of heat treat ovens and furnaces; calibrates the gages and instruments on the hydraulic test equipment, flushing it when necessary; services and repairs spot-weld machines; and inspects, oils and lubricates machinery. It is responsible for transportation facilities inside the plant, greasing and repairing the trucks during the night shift, and charging batteries when they run low.

The operations service section repairs and overhauls all facilities and equipment operated by the Heating and Ventilating Group and conducts preventive maintenance checks on all equipment, including space heaters, air conditioning units, refrigeration equipment, air compressors and all miscellaneous pumps, filters, boilers, traps and kitchen equipment.

The high tension power section is on a 24-hour schedule. To assure proper electrical power distribution, it makes regular inspection tours of primary power and sub-station rooms and the outside high tension lines. It checks the meter readings and adjusts the equipment to keep the power loads in accordance with operating specifications, equalizing the line loads if necessary. The section also inspects underground cables and conduits.

Buildings and Grounds Repair

Building and Field Maintenance. This group is responsible for the repair and upkeep of all plant buildings, hangars, fields, yards, parking lots and roads. It is sub-divided into four sections, of which the building and field maintenance section schedules preventive maintenance inspections on all equipment not covered by the other groups, and performs all necessary moving of furniture and rearrangement of office and factory areas.

All painting is done by a section specifically set up for this work, and the snow removal section takes care of that detail. The sanitation section maintains good housekeeping throughout the plants, both inside and out, including cleaning and sweeping, disinfecting, trash removal, rodent control, and maintenance and operation of the incinerator.

Construction. The function of this group is confined to all projects engineered by the Plant Engineering and Layout and Facilities Section with the approval of the Facilities Control Board. If necessary, a blueprint is prepared along with a work order, which provides a description and the specifications of the work required.

In accordance with engineered drawings, the group rearranges machines, equipment, benches, work tables and stock rooms in setting up areas for new manufacturing projects. It constructs or modifies partitions, enclosures or shelving, and installs any needed fixtures or facilities when requested by the department. As approved by the Facilities Control Board, the group modifies or installs plating tanks, stripping processes, heat treat furnaces and tanks, and other equipment.

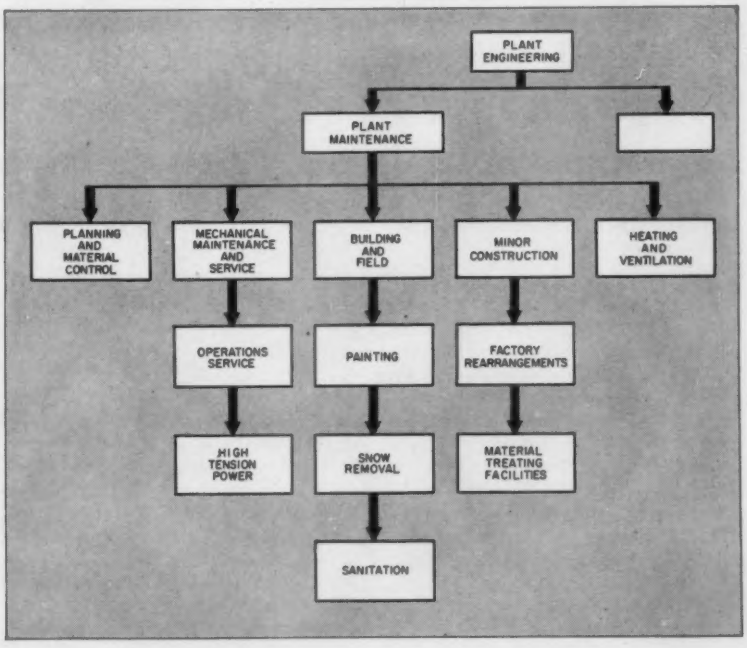
Heating and Ventilating. The primary function of this group is comfort control of the plants, a 24-hour a day operation. The group is responsible for regular tours of inspection for all heating, cooling, steam, hot water, ventilating and compressed air facilities.

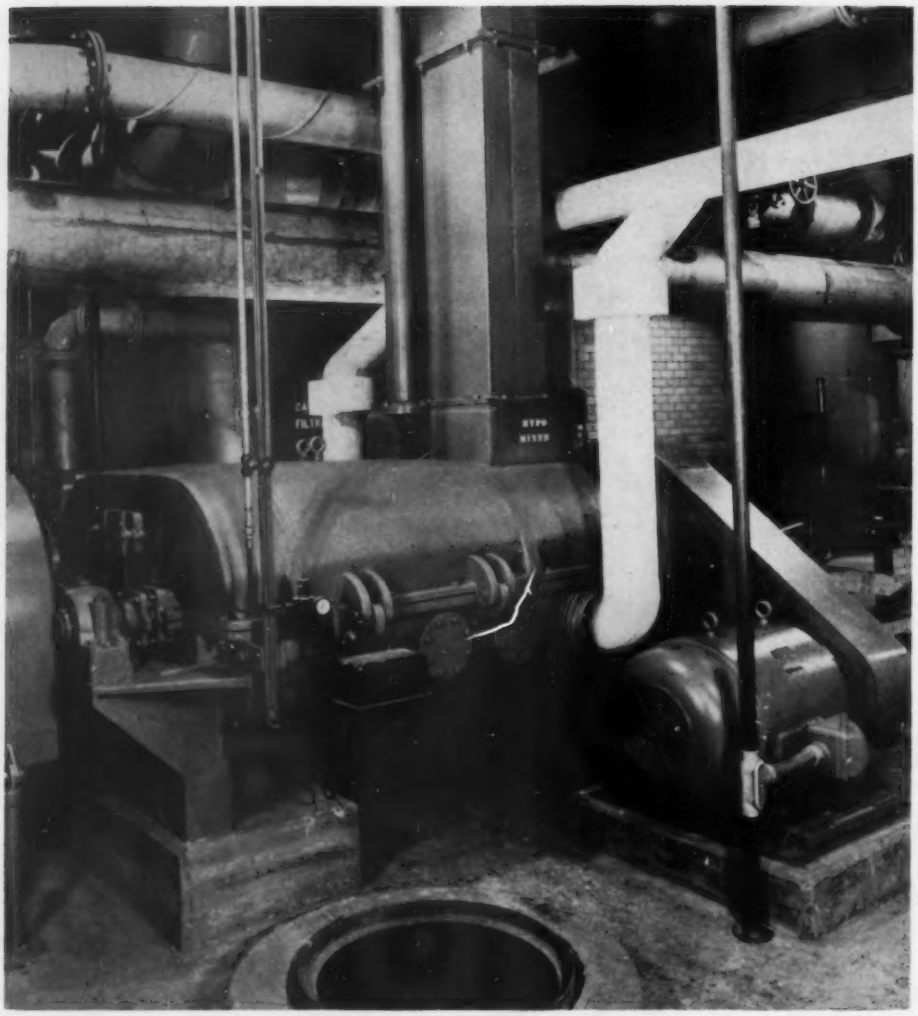
It provides and maintains the air filtration system, and collects the station logs, routine test information and recordings of temperature, humidity, pressure and operating cycles for study and analysis.

The Maintenance Department at Martin is more than just another department. It is an integral and highly necessary unit of the company. Without maintenance crews, the principal objective of the company would fall far short of its goal. With an efficiently operating maintenance program, the repair work is carried on simultaneously with the manufacturing processes.

Fig. 6. Crew maintains airport roadway

Fig. 7. How various groups of Plant Maintenance department are organized





Equipment, piping and conduit are exposed to water vapor, bleaching agent in neutracel bleach plant

Materials Pre-Tested on Special Board

Data Points to Choice for Corrosive Environment

By VICTOR S. OAKES, Electrical Engineer, Hammermill Paper Co., Erie, Pa.

UNUSUAL CHEMICAL conditions prevailing in the pulp and paper industry pose special problems to the engineers who specify for electrical services. Such problems are closely approached in other industries.

Use of test-board data and records compiled by our engineering department guide us at Hammermill in the selection of electrical conduit for a particular installation. The information gained permits us to scale available conduit materials against known requirements and provides a logical basis for comparisons under actual operating conditions.

Such test-board technique is especially useful in determining the qualities of various types of conduit. It can be set up in any plant with a minimum of effort and over a period of time reveals how well each material stands up to the chemical conditions peculiar to the plant area.

Since moisture, acid and other damaging elements vary from plant to plant, the individual electrical engineer must determine the materials he wishes to check and then decide in which plant area the test board should be installed.

At Hammermill, our test board has been mounted in the sulfite mill since September, 1955. It is subjected to corrosive fumes in that area. Atmospheric conditions to which the specimens are exposed include: acids of sulfur (principally sulfurous acid), organic acids, and chlorine from nearby bleach settling tanks.

Attached to our test board are five different types of conduit. They are: 1. black enamel; 2. hot-dipped galvanized; 3. metallized-galvanized; 4. aluminum; and 5. sherardized conduit with an extra coating of acid-resistant enamel.

Selection of conduit in our plant is

based on the degree that available materials measure up to the general requirements of any electrical installation and to the more specific demands of our type of industry. Generally, requirements include: 1. the conduit must be non-inflammable; 2. it must be rigid, to have inherent strength and be reasonably self-supporting; 3. it must offer long life potential; 4. provide a smooth inner surface for pulling wires; 5. should be relatively inexpensive; 6. be as light weight as possible; 7. offer a minimum resistance to hand-bending in the small sizes.

Early failure of some types of conduit when exposed to the corrosive environment of pulp and paper mill operations constitutes a hazard and creates costly maintenance problems. In our industry, conduit is frequently used in concealed locations where evidence of serious corrosion is seldom apparent until trouble develops with the electrical system.

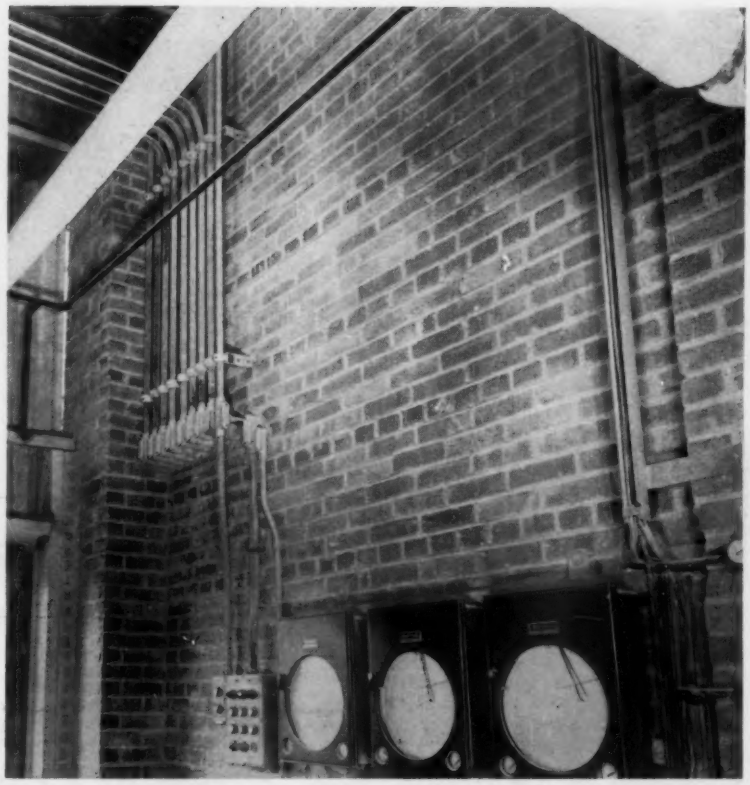
Minimum Maintenance Desirable

Conduit material must therefore be able to resist the prevailing corrosive conditions with a minimum of periodic painting and maintenance. Corrosive resistant properties should not be affected by nicks, scratches and mechanical damage inflicted on the conduit during normal handling and installation.

Expense of installation and expected frequency of maintenance are major influencing factors in the proper selection of conduit. Since the price of the conduit itself may be less than one per cent of the total cost of the job, the true evaluation is determined by the long-range dependability of the material used. New types of conduit are becoming available. One of these, which is used extensively at Hammermill, is a sherardized conduit with an enamel coating of vinyl chloride acetate copolymer and is known as Superduct.

The importance of periodic painting must not be overlooked when considering means of controlling corrosion in existing installations. Before the wide acceptance of zinc-coated conduits, painting was the only means of protecting black enamel conduit from acid fumes and moisture.

At Hammermill, a painting program is in effect which reaches all parts of the plant once every three to four years. In the past, this procedure has been effective in controlling corrosion on exposed metals in the mill. However, the continually increasing cost of labor makes this program one which we might well eliminate. Our ultimate goal is to provide long-life conduit installations which do not require painting.



Corrosion-resistant conduit used in sulfur-melting building reduces maintenance

Equipment in electrical control room must resist the attack of bleaching agents

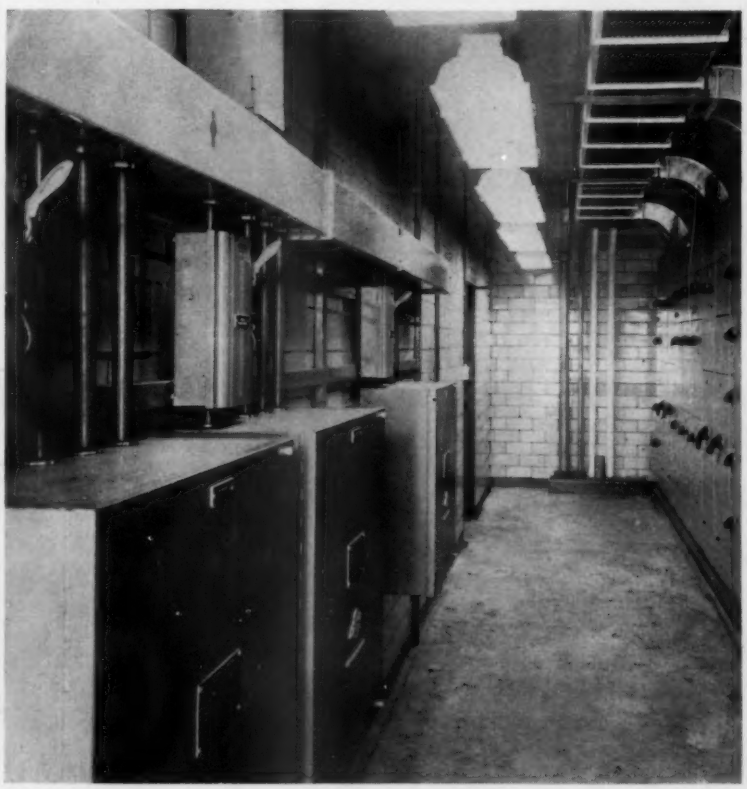


Fig. 1. Plastic ductwork exhausts hydrofluoric acid fumes from crystallizing tanks where fluoride salts of tantalum and columbium are separated by fractional crystallization. Ductwork can be drilled, cut, patched or welded on the job

Plastic Ductwork Confines Corrosive

Reasons Why Plastic Was Selected: Because It Is Simple To Erect,

By W. M. CAMPBELL, Ventilating Engineer, Fansteel Metallurgical Corp., North Chicago, Illinois

WHILE TANTALUM is a metal best known for its almost complete immunity to corrosion and chemical attack, the processes of making and cleaning tantalum present a number of unusual and severe corrosion problems.

Unlike other metals which are made simply by smelting ores, tantalum is made by powder metallurgy. Ores are broken down chemically, and intermediates undergo a series of chemical treatments until a chemically pure compound is attained, which is reduced to metal powder.

These chemical processes require constant vigilance and a scheduled maintenance program to make sure that acid vapor does not cause an excessive amount of corrosion to equipment, overhead piping and structures.

The chemical processes involve the use of several acids. Those most commonly used are 10 per cent hydrofluoric acid at 218 F and 5 per cent hydrochloric at 218 F. Under these conditions, acid solutions in 1500- and 2000-gal tanks generate large quantities of acid-laden steam which is removed by an elaborate ductwork system. The ductwork is so designed that condensation which takes place within the system drains back into the tanks. Where there is possibility of contaminating the process, the condensate is trapped in a drain boot before it reaches the tank.

Several types of ductwork have been used through the years, ranging from asphalt-lined wood to rubber-lined steel. Early in 1956 the first polyester duct was installed. This was done after a number of tests of various manufacturers' products, and it was found that there are a number of good ones available. One of these is the product of duVerre, Inc., Buffalo, N. Y.

Two types of plastic ductwork are used. One, a polyester resin bonded to Dynel cloth, successfully handles hydrofluoric acid vapors. The other, a polyester resin bonded to glass fibres, is excellent for hydrochloric acid vapor. The material is available in a number of colors, including blue, green, straw or red. It is feasible to adopt different colored ductwork for different vapors.

Plastic ductwork requires only a minimum of maintenance. No exterior painting is required. The use of flanges, which can be a troublesome source of leaks, is kept to a minimum by the use of butt welds in the piping.

This material is light in weight, requiring only simple hangers or supports. For example, a section of polyester duct 8 ft long, 14-in. diameter, weighs 60 to 65 lb, and can be handled or installed easily by one man. An equivalent piece of 11-gage steel will weigh 144 lbs, plus 130 lb for 3/16-in. rubber lining and 36 lb for two rolled angles for end flanges, or a total weight of approximately 310 lb.

The polyester ductwork we have used so far ranges from 4 in. to 42 in. in diameter, from ⅛ to 3/16 in. in thickness, with ⅜-in. flanges. All sizes, round, rectangular or special shapes can be drilled, cut, patched or welded right in our plant.

Welding is a relatively simple procedure which can be learned with a little practice. Approximately a cupful of resin, which comes in one-gallon cans, is sufficient to make one butt weld on a 10-in. diameter duct. The procedure is to pour the measured amount of resin into a convenient container, add one-half teaspoon of accelerator and mix thoroughly. Glass fiber strips, cut to desired size, are laid out on a board or other smooth surface. When this is done, work must proceed rapidly. Add one-half teaspoon of catalyst to the resin and stir

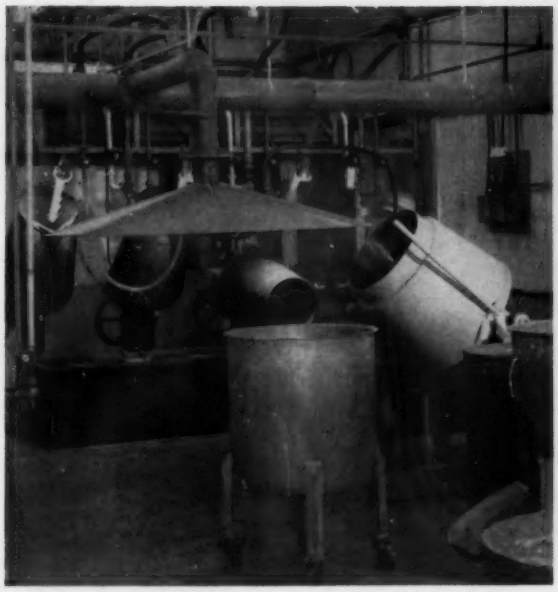


Fig. 2. Plastic duct and hood are used over retorts where metal powders are washed with nitric and hydrofluoric acid

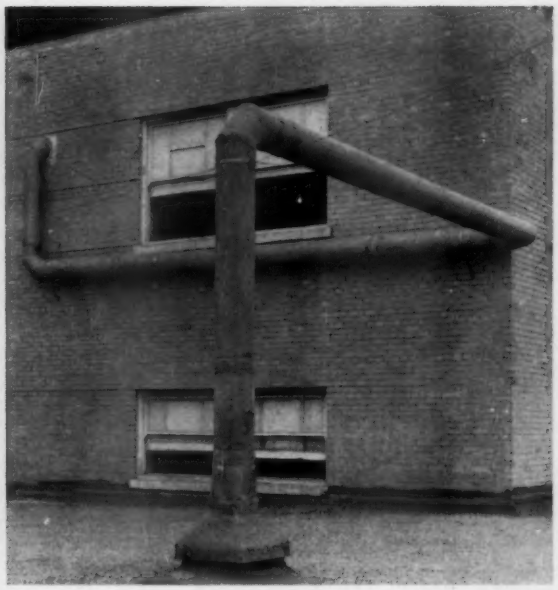


Fig. 3. Exposure to outdoor weather presents no problem. Plastic piping requires little support, never needs painting

Acid Fumes at Fansteel Metallurgical

Easy To Alter and Low in Maintenance Cost

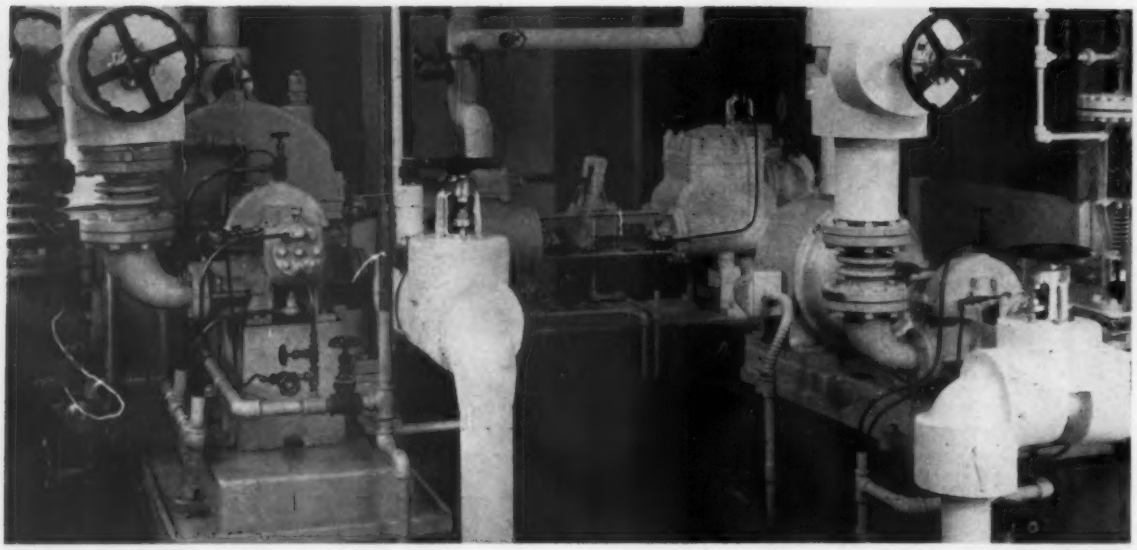
vigorously. Pour the mixture on the fiber strips and work it into the fibers. Pick up the soaked mat and wrap it around the joint to be welded.

Three similar operations are desirable for each weld, each subsequent wrap being a little wider than the preceding one. Air bubbles should be worked out of each wrap before the next one is applied. The welds react chemically, and will become very warm to the touch before they "set" and begin to cool. This reaction requires about 20 minutes, after which the welded piece can be used. Complete curing and setting takes about three hours.

In addition to ductwork, the same material is used for hoods. One such hood, 33 ft long, was manufactured for us by Heil Process Equipment Co., Cleveland, and is installed over a large acid cleaning tank where our tantalum and molybdenum sheet, bar and rod are cleaned. The acids used are 50 per cent hydrofluoric and 50 per cent nitric, both mixed and separately, also hydrochloric and sulfuric. Temperatures as high as 170 F are attained.

The hood previously used was of plywood construction, which lasted about five years under severe acid, water and steam conditions.

Fig. 4. Ductwork is easily assembled on the job by welding the sections together with glass fiber strips which have been soaked in prepared quick-setting resin



This pump installation in a New England mill's boiler plant follows the rules. The boiler feed pumps are in foreground

PUMPS—and Why They Have Troubles

Not Genius, Just Knowledge, Required In Installation

By **FRANK YOUNG**, Field Engineer, Warren Pumps, Inc., Warren, Mass.

PUMPS, LIKE HUMANS, can acquire a variety of ailments, some in a very short time. Although the pump leaves the manufacturer in good condition, it may not work properly, shortly after installation. Perhaps only a small percentage of installations give

trouble, but plant engineers and operators will benefit by learning of some troublesome cases and the remedies that were applied.

After a pump has been shipped out to a customer it is no longer the responsibility of the manufacturer. Needless to state, the manufacturer should live up to his warranty to replace defective material and/or workmanship in the prescribed period. It is to his advantage that the unit performs according to his promises and the expectations of the customer.

Instruction books and warning tags are wired to the pump in conspicuous places. The customer or contractor should check these items upon receipt of the unit and see that it is properly handled so as to eliminate any chances of bent shafts or other damage due to mishandling. Parts such as packings and coupling parts should be carefully checked against the bill of lading. Sometimes a pump is installed by someone who is unfamiliar with pumps and their maintenance. These are the trouble jobs. It cannot be stressed too strongly —*find the instructions and see that they get to the person responsible for the installation.* A few typical examples of faulty installations will indicate how some trouble could have been avoided.

The Inaccessible Pump Gets Little Attention

In one particular case there were two 6 x 4 x 6 duplex boiler feed pumps, one of which refused to run. The pumps were located in a pit with a receiver and a maze of steam and hot water piping blocking the access. After squeezing and twisting into the pit the service-man was able to remove the steam cylinder covers.

By feeling and using a mirror he learned that the steam pistons were rusted into the cylinder. The pistons were removed with difficulty, new rings were installed and the cylinders cleaned. Fortunately corrosion had not progressed too far and the cylinders were only slightly pitted so that the pump operated efficiently when reassembled. The steam and exhaust valves leaked. Cylinder drains had never been opened. Nor had the pump been jacked over when idle. It was definitely a case of out of sight, out of mind.

If it is absolutely necessary to place pumps in a pit, there should be sufficient clearance around the unit for maintenance and inspection. Steam and exhaust valves should be tight and pumps properly drained when secured. Idle pumps should be jacked over by hand daily. These precautions will extend the useful running life and save an expensive rebore job. Another dan-

ger of pit installation is flooding, especially with motor-driven units. Provision should be made to prevent this. However, the best solution is to design the piping layout so that it is not necessary to place pumps in pits.

Distortion of Base Plate Will Cause Misalignment

It is disheartening to begin installation of a unit at a plant and find excessive misalignment due to distortion of the base plate, with the pump and driver all piped up. Usually the cause can be traced to the fact that the unit has been set down on the rough foundation with no allowance for grouting under the base plate. There are two alternatives to correct such a situation. One is to cut all the piping loose; the other to cut about an inch off the top of the foundation so that the unit can be aligned using wedges under the base plate. In either case piping changes must be made and may run into considerable expense.

Before a foundation is poured, the foundation bolts should be properly located so that they extend the proper distance above the top of the rough foundation. The unit is set on wedges placed adjacent to the foundation bolts and leveled and aligned by adjusting these wedges. Secondly, the unit is grouted in and the grout allowed to set four days to a week before tightening foundation bolts solid. Alignment of couplings is again checked and any adjustment necessary is now made by shimming under the feet of the driver. Now the unit can be piped up.

Pipe to the unit with proper provision for taking up pipe expansion and support pipe so that no strain will be transmitted to the pumping unit. Flanges should face square, requiring no springing or forcing. Alignment is again checked and after unit has run and attained operation temperature, check once more. If everything is okay, dowel the feet of the driver. All units mounted on a base plate are aligned at the factory but it must be borne in mind that a base plate is to some extent flexible. Drivers are not dowelled until after final field check on all horizontal units. Vertical units usually are dowelled before leaving the manufacturer's plant.

Sagging Foundation the Product of Careless Construction

Where concrete foundations are not substantial enough and reinforcing steel inadequate or entirely missing,

we sometimes encounter sagging. In one case the foundation was set on a 3-in. concrete floor which had cracked and settled. These conditions distorted the unit, caused serious misalignment, and resulted in excessive coupling and bearing wear.

Foundations must rest on solid load bearing soil or slabs and should be of structurally sound design. It is also a good idea to isolate the foundation from the floor to prevent noise transmission by ringing the foundation with cork or mastic before pouring the concrete floor.

The work of correcting foundation deficiencies after the unit has been put in operation costs money and takes quite a bit of time.

Steam-Starved Pumps Lack Performance

A steam pump's performance depends on the ratio of the water to steam piston areas. This function is to deliver water against a higher pressure than that of the steam. This is the case with boiler feed pumps. To perform this function steam in sufficient volume at the required pressure must be supplied to the pump.

Undersized piping, and other restrictions such as governors of insufficient capacity, will decrease the efficiency of the pump and cause it to run slowly or not at all. The effective net steam pressure is the pressure shown at the valve chest *minus* the exhaust pressure. Increasing the exhaust pressure has the same effect as lowering the steam pressure. When operating steam pressures are low and piping runs long, condensation pockets can become quite a problem. Steam lines properly sized and drained will do much to prevent pump troubles.

One story of a steam-starved pump follows. This pump, a boiler feed pump was a 7½ x 5 x 6 duplex. It had been overhauled and put in first class shape. When the boiler was lit off and put on the line after shut down, this pump couldn't deliver water to the boiler without cutting in the city water supply on the pump suction with the resultant high fuel consumption.

The boiler operated on a high-low switch to a rotary burner with the steam pressure varying between 90 and 110 lb. A pressure gage was installed on the valve chest of the pump and showed only 50 lb. Steam piping was of ample size and had been adequate before. It was necessary to chase back to the header supplying the steam to the pump, and this also showed 50 lb although the steam gage on the boiler showed 110 lb. The boiler was secured and cooled down as rapidly as safety permitted.

When the bonnet of the steam nonreturn valve was removed it was found

that the dashpot rings had broken and jammed so that the valve was barely cracked off its seat. This condition was rectified and the boiler lit off. The pump now had ample steam and delivered water to the boiler without any trouble. It was necessary to readjust all reducing valves on the steam distribution piping.

Such situations could be avoided. However, too many times in the small plant the boiler room is neglected when it comes to devoting time and spending money for maintenance. The boiler feed pump is the heart of the boiler plant. Without the pump, there will be no water and no steam. Some plants have only one boiler feed pump supplemented by an injector to cover the insurance requirement for two independent means of feeding a boiler. There should be a standby boiler feed pump to assure continuity of steam production.

Flexible Couplings Are Not Universal Joints

Flexible couplings are used primarily to allow shaft endplay and to compensate for minor misalignment due to temperature changes in the unit. Rims and faces should be aligned within 0.003 in. Differences in height between pump and driver coupling for temperature correction, is shown on a

warning tag attached to the coupling. When properly aligned and maintained, the coupling will last indefinitely, providing lubrication instructions are followed. The grid and tooth type coupling wears rapidly if allowed to run dry.

(Please turn page)

Steam Bound Pumps Fail to Deliver Volume Expected

On the suction stroke of a steam pump, pressure on the suction valves is reduced so that the pressure in the suction line will open the valves. "Steam-binding" results when the pressure over the suction valves is lower than the vapor pressure of the liquid being pumped. Whether this happens because of too low an NPSH or because of pipe friction losses, the liquid flashes and the pump starts to pound and race.

Since flashing liquid cannot be pumped, delivery stops. On some old installations the receiver tank or hotwell for boiler feed pumps was located almost at floor level so that very little suction head was available. This arrangement was suitable when most of the returns were wasted and fairly cool water was handled. Fuel was cheap then and in many cases it was less expensive to burn extra coal than to recover the returns from a building some distance away. With increased fuel costs today, the engineer recovers as many returns as possible, the receiver temperature sometimes runs up to 200 deg, and the pump acts up as a result.

To recover returns and then waste them at the receiver by running enough cold water in to drop the temperature of the water so it can be handled by the pump is now a double cost. It is impractical to recover returns if they can't be used.

To make them usable the receiver should be elevated so as to provide enough head on the suction to prevent flashing in the pump. This investment will soon pay for itself in fuel savings as well as in wear on the pump.

One steam bound pump we investigated had developed trouble on the discharge side. It was a horizontal duplex, 5¼ x 3½ x 5 taking suction from a deaerating heater located some 20 ft above. The same heater supplied water to a centrifugal pump used when two or more boilers were operating. On single boiler operation the steam pump was used and the water level controlled by hand-setting the throttle of the pump. When this pump was operating very slowly or stopped, it became steam bound and raced away when it was speeded up to feed the boiler.

During this operation severe noises and hammering developed in the suction line and in the deaerating heater. Examination revealed that the pump suction and discharge valves were leaking and also that the feed check valve on the boiler, and at the pump discharge, were in poor mechanical condition.

At low speeds there was enough leakage in the pump valves to reduce the discharge pressure below that of the boiler resulting in a backflow of water from the boiler. When the water reached the low pressure zone in the suction line it started flashing and when the speed was increased this leakage became greater, causing water hammer all the way back up to the deaerator. Refacing the pump valve seats and replacing the faulty checks eliminated the trouble. Overhaul of boiler mountings during the annual shut down or shut down for internal inspection would have prevented these occurrences.

The Cavitating Pump and What's Behind It

When the pressure at any point inside the pump drops below the vapor pressure of the liquid, the liquid partially flashes and forms vapor bubbles. These vapor bubbles are carried along with the water to a higher pressure region where collapse or implosion takes place.

This implosion phenomenon is characterized by a crackling noise and sometimes by loud knocking as these vapor bubbles are collapsed. The pump capacity then drops off because of the volume occupied by these vapor bubbles. If it continues, serious damage to running parts will result. Vibration of the unit because of hydraulic unbalance and wear of impellers will also occur.

Centrifugal pumps that handle hot liquids without enough positive suction head to overcome the pressure loss through the eye of the impeller are prone to this condition even when vented back to the source of supply. Oversized condensate pumps that are self regulating will run at the break-off point on the head-capacity curve and eventually cavitate. Screw and gear pumps with a suction lift and inleakage of air will cavitate. Pumps handling heated fuel oils may cavitate due to the vaporizing of the light oil fractions.

Here Are Some Examples of Cavitation

A centrifugal boiler feed pump that takes suction from a deaerator with adequate submergence has been cavitating periodically, especially on light loads. A gage installed on the suction flange of the pump indicated a drop from 8 lb to 0 lb during the periods that cavitation took place. A check on the deaerator pressure gage showed a drop from 2 psig to 0 psig.

Investigation showed that returns came to a receiver tank and were pumped to the deaerator. The level control valve governing these returns on the deaerator was a solenoid valve operated by a float switch installed on the deaerator then showed the cycle of events. When the solenoid valve opened, a large quantity of comparatively cool returns were pumped in.

The steam supply reducing valve was too small to meet this sudden demand. Therefore, a vacuum of 8 in. was created in the deaerator because the vacuum breaker check valve was too small. When this occurred the pump started to cavitate until cooler water from the deaerator reached it. The water at the pump suction was still 220 F and the positive suction head had been reduced because of the vacuum in the deaerator. Solution: use of a float-controlled valve to throttle returns and provide a continuous flow as originally installed in the deaerator.

In another instance a screw pump that handles fuel oil was cavitating when shifted from No. 4 fuel oil to No. 6. In the first application the suction gage showed about ½ lb pressure probably because the tanks were located a little higher than the pumps.

In the second application, with more viscous oil, the gage showed 8 in. vacuum and the pump cavitated badly. The reason: a transfer pump located some distance away discharged into the suction manifold. This connection was not valved at the manifold. So, a full gasket was installed at these flanges to prevent inleakage of air from this line. The pump then operated satisfactorily on No. 6 oil. A valve was later installed.

A steam pump in similar service would not come up to speed as the steam strainer in front of the governor was plugged. Cleaning the strainer corrected this condition.

Many fuel oil pump and heater sets have both a steam pump and a gear or screw pump. The steam pump is not as sensitive to air inleakage as is the rotary. It can handle certain amounts of air and eliminate conditions conducive to cavitation without giving the steam pump any trouble. All valve stem packings should be tight and all pipe connections also. Suction strainer covers should be checked for leakage if the rotary pump cavitates.

A Dry Pump Means a Rebuilding Job

A dry pump can be very serious. Often there is a complete loss of rotating and stationary wearing surfaces, twisted and broken shafts, and in some cases on boiler feed pumps, burned-up boilers. Running clearances on a centrifugal pump are close in order to hold leakage between stages, and from the discharge of an impeller back through the suction to an absolute minimum.

When a pump runs dry and these surfaces touch each other, frictional heat is generated and the pump will seize. This sometimes causes twisting of the shaft because of the shock.

This might mean a rebuilding job.

Another cause of seizing in centrifugal pumps is a shut-off on the discharge line. Pumps for boiler feed, and return, are fitted with a recirculating line so that enough water is pumped to keep the water from flashing. This is controlled by an orifice. On a pump operating at shut-off the disc friction which is equal to the horsepower at shut-off will heat up the water and generate steam. When this occurs the pump seizes. Extreme cavitation can also result in pump seizure.

Most common cause of pump seizure is a dry deaerator. This will never occur if a low water alarm is installed. It should be tested periodically by blowing down the float chamber. Such precaution will also prevent sludge build-up which makes the float inoperative.

In addition, an emergency make-up should be hooked up to the deaerator to open at a low water level. This should be done even if make-up water is introduced in a return tank and pumped to the deaerator.

In addition to the safety precautions installed, the deaerator should be accessible for periodic check. A heater floating on an extraction line should have a steam make-up valve to maintain heater pressure when extraction pressure drops off. Such a valve also will prevent flashing at the pump. Recirculating lines should always be open at low loads and should be run clear to the heater through a low pressure swing check valve. A few precautions will eliminate costly repairs.

Proper Packing and Its Importance

Packing troubles develop occasionally on centrifugal pumps. The manufacturer's recommendations for packing should be followed. Centrifugals are often provided with hardened shaft sleeves to take packing wear and protect the shaft. If the proper packing is installed and renewed at recommended intervals, pumps that are handling clear water should experience few packing troubles. A small amount of leakage is, of course, necessary to lubricate the packing. This is controlled by the packing adjustment at start-up.

Usually, the main cause of packing failure on a new unit is due to tightening the glands too much. Glands should be pulled up a hex at a time and left for a while before tightening again.

Once a shaft sleeve is scored, leakage cannot be controlled. Because of a tendency to pull up the gland and add a turn of packing, the sleeve condition gradually gets worse, until the packing has cut through the sleeve and into the shaft itself. When this occurs nothing can remedy it. In one particular pump installation the shaft ran out 0.020 in. because the packing had cut almost half way through the shaft and had kinked it. All running clearances were worn by this amount. The pump vibrated considerably because of shaft runout and excessive leakage developed along the shaft. In addition, the bearings burned out and a complete new rotor was needed.

Indiscriminate tightening of packing glands must be avoided. Even if the shaft isn't cut the useful life of the shaft sleeve is greatly reduced. What's more, replacement means removing rotor from pump and stripping both ends to remove and install new sleeves.

On steam pumps using stainless steel rods a mica-lubricated packing should be used and steam end rods swabbed in cylinder oil only. No graphite is added. Graphite and stainless steel don't get along together and rods will quickly score when graphite is used as a lubricant.

Abrasive Material Causes Wear

Rapid liner and packing wear on steam pumps is usually caused by abrasive material in the water. It is more rapid when the pump has a hard fibrous packed piston. This occurs on feed pumps and vacuum pumps and is an expensive item if liners and rods have to be replaced. In plants which do not have a deaerating feed water heater, the most common cause of wear is corrosion in return lines. Oxygen and CO_2 which are not removed in a receiver cause corrosion. The worst condition exists in lines that are alternately filled with steam and air.

Plant heating systems which are idle and unprotected during the non-heating season are prime suspects for this condition. Rust and scale are returned to the receiver either by gravity or via the vacuum pumps. To protect the vacuum pumps, a sediment chamber should be installed on the suction and cleaned periodically.

Feed pump receivers should have the pump suction extended 4 in. to 6 in. up inside the receiver and returns should enter at the other end, preferably in a sedimentation chamber which can be made by installing a spill-over baffle. This chamber should have a 2-in. blow off connection for removing the abrasive material at intervals without disturbing operation. Receivers should be manually cleaned during an annual shut down. If abrasives are kept out, liners and rods will last much longer.

In one case, excessive rust was found in a newly installed pump. This rust was magnetic, the piping runs were brass and the pipe fittings cast iron.

Makeup water was from a small pond was used and there was drainage from a considerable area into the pond. Chloride used on the roads during the winter drained into the pond in the spring and caused corrosion in the makeup piping. This polluted water entered the receiver and the pump.

When the pump was opened, a quantity of rust was removed from the cast iron on which it had collected. Extending the suction into the receiver and installing a duplex strainer on the makeup line was the solution. A protective coating should be applied to cast iron when salt is present. This should prevent galvanic action.

Clogged Pumps Are Inefficient—Sometimes Won't Work

In many cases the boiler feed water treatment is introduced on the suction side of the boiler feed water pump either in the receiver or in a charging tank. If the pump is bronze the chemicals will cause rapid wasting of these parts. In one case, boiler compound had been fed into a deaerating heater. The temperature was high enough to throw down a soft scale in the suction piping. This practice was discontinued when the bronze impellers and case rings showed wasting.

The scale remained in the lines however. Gradually the pump capacity dropped off until the boiler pressure had to be lowered so the pump could deliver water to the boiler.

Next, it was then necessary to drop the plant load to permit the opening of the pumps. When the motor driven pump was opened, the impellers and pump passages were clogged with scale which had broken off the walls of the suction piping. Since the soft scale had not damaged the pump it was put back on the line after the impeller and pump passages had been cleaned.

The plant could then deliver full load. However, when checking the turbine-driven pump the turbine could not be brought up to speed. The blading was badly eroded due to improper drainage of the turbine case. Rebladding and a trap installation solved this problem. Boiler compound should never be fed into the feed pump suction. Even when fed into the feed line on the discharge side of the pump, trouble may be experienced with any bronze fittings such as stop and check or other types of valves.

These are just a few of the trouble jobs encountered by our field engineers. All of them could have been avoided. When pumps are properly selected, installed and maintained they will give long and trouble free service. Many times the boiler feed pump will outlive the boiler. Proper engineering service will more than pay for itself and will save the plant engineer quite a few headaches.

A pump is a precision machine and must be treated as such. By following proper installation procedures and studying instructions and warning tags troubles can be avoided.

VIII. Installation Guide

Tips on Putting in Pneumatic Cylinders, Controls, and Piping

By H. L. STEWART and J. M. MORITZ, Logansport Machine Co., Inc.

HOW WELL A PNEUMATIC system functions often depends upon the care with which it is installed and how well it is maintained. Did you ever walk through your plant during working hours and all of the pneumatically operated machinery seemed to be working satisfactorily? Yet, when you made the same trip when the plant was not in operation, you could hear a hissing of air coming from nearly every machine due to leaks in pipe lines, cylinder packing glands, and through gaskets in valves.

When machinery in the plant is in operation, the noise is apt to muffle the hissing sound of the air, but as soon as the noise stops, the leakage of air is quickly sensed. Since compressed air is comparatively clean, not much attention is paid to leaks. In hydraulics it is a different proposition. As soon as a messy condition from oil leaks is detected, something is done about it at once.

Pneumatic leaks are expensive as compressed air is not a cheap commodity. Pneumatic leaks can usually be attributed to careless installation or poor maintenance. Since these articles are directed to the plant engineering or maintenance groups, we would like to suggest that they follow, in their installation and maintenance of pneumatic systems, some system of standardization. The system of standardization for installation can be the one set by the Joint Industrial Conference (J.I.C.) or specifications set by your own plant operating group can be followed. While there is no nationwide set of standards for maintenance, each plant operating group should set their own standards and make it mandatory that they be strictly observed. By having standards for both installation and maintenance much time will be saved.

In order to help the men who are installing a pneumatic circuit, a diagram of the circuit using J.I.C. symbols such as shown in Fig. 1, will be of great benefit. While it does not give the lengths of the piping, it does show them exactly how the circuit is piped.

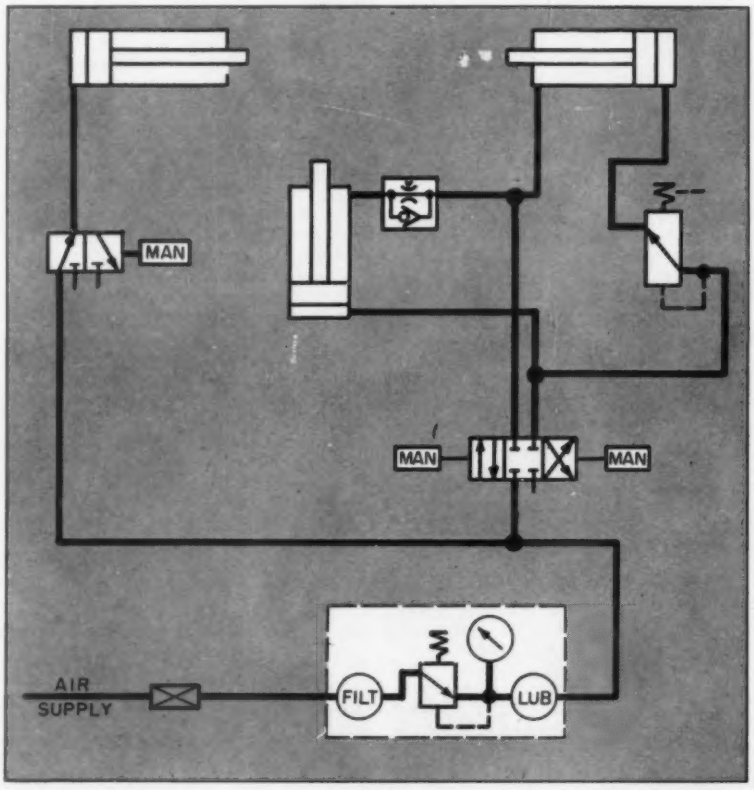


Fig. 1. Good use can be made of J.I.C. symbols in layouts such as this one

A circuit sketch, Fig. 1, not only makes the job easier for the installer, but it is also of great value to the trouble shooter for checking the system in case of failure. It is well to have a copy of the circuit diagram securely attached to the machine in a position so that it is readily available.

Air cylinders are manufactured in numerous mounting styles. They can be foot mounted, rod end flange mounted, blind end flange mounted, trunnion mounted, clevis mounted, and so forth. It is necessary that the correct mounting type be selected for the job. While it is not the job of the installer to make the cylinder selection, an alert plant engineering man can often make valuable suggestions to the tool or machine designer so that he makes the proper selection. So often we find that a user will make a selection in cylinder mounting. Then after he receives the cylinder, he can't use it and must change the cylinder covers. This is not only an added cost to him, but often it causes considerable delay.

For an illustration of an incorrect choice of mounting, see Fig. 2. It can be readily seen that there will be a side thrust against the piston rod. This will, in turn, cause excessive wear on the rod packing and rod bushing and may cause breakage of the feet on the covers. Figure 3 shows

the same installation using a trunnion mounted cylinder which eliminates the difficulties encountered in Fig. 2.

When installing an air cylinder here are some of the rules one should follow: 1. Mount cylinder solidly. Remember, even though air cylinders do not impart the power that hydraulic cylinders do, their pistons travel at a high rate of speed and usually create considerable shock at the end of the stroke. Also, on high cycling applications, considerable shock and vibration result.

If the cylinders are of the foot mounted or centerline mounted styles, all of the mounting pads must be flat and level. It is suggested that in addition to the hold-down bolts that keys be placed against the covers to help absorb the shock as shown in Fig. 4.

If a trunnion type cylinder is used, make certain that the trunnion pins are in alignment as well as the bushings in the trunnion. The trunnion bushings should snugly fit the trunnion pin so there is about .005 in. clearance. The bushings should be well lubricated.

If a pivot type cylinder is used, a husky clevis bracket should be installed and solidly mounted. The clevis pin in the bracket should fit the hole in the blind cover within .005 in., providing lubrication to the bearing surfaces is necessary. When flange mounted cylinders, either rod end flange or blind end flange, are needed, the mounting surfaces must be flat and perpendicular to the line of action.

It is recommended that, since vibration often causes common fasteners to loosen, a locking type fastener be used to fasten the mounting of air cylinders.

2. Provide support to piston rod. Wherever possible the end of the piston rod of an air cylinder of long stroke should be adequately supported. This support should be guided so that the end of the rod should always be in line with the front cover bushing. It is often found that while the end of the rod is supported, the alignment is poor and considerable side thrust is thrown on the rod bushing and packing. This is one of the major causes of packing failure.

3. Provide ample protection to piston rod. Often cylinders are placed in locations that will cause damage to piston rods if they are not properly protected. Protection may be accomplished in several ways. If the piston rod is subjected to water spray or certain chemical sprays, then the use of a cylinder with a stainless steel, chrome plated steel, or some other non-corrosive material is suggested. Along with these materials it is suggested that the cylinder be equipped with a scraper or wiper to remove any residue that may collect on the rod, before it passes into the packing. See Fig. 5.

In extremely dirty or dusty locations such as in a foundry, piston rods are often protected by collapsible boots, as shown in Fig. 6. These boots add very little to the overall length of the piston rod. In order to find the approximate extension needed when using a rubberized fabric boot, use this sample formula and add amount required for connections:

$$0.066\left[\frac{\text{total stroke of cylinder (in.)}}{\text{boot O D (in.) - boot I D (in.)}}{2}\right]$$

Boots are constructed of rubber, leather, canvas, impregnated fabric and so forth; the selection depends

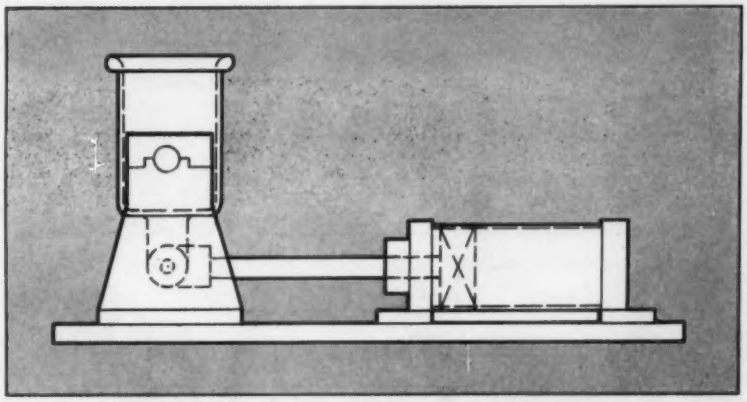


Fig. 2. This is an application of an incorrectly mounted pneumatic cylinder

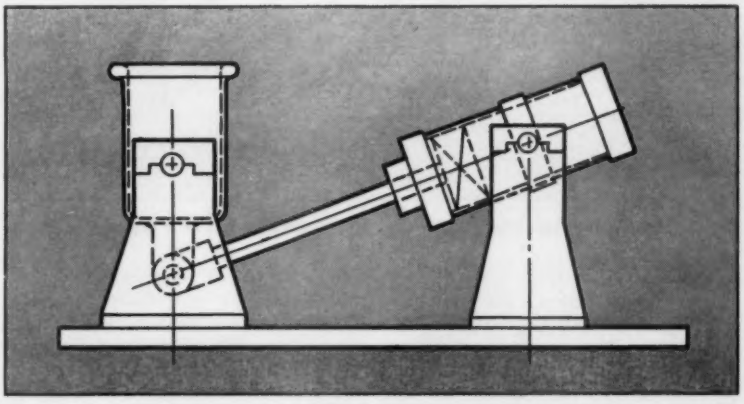
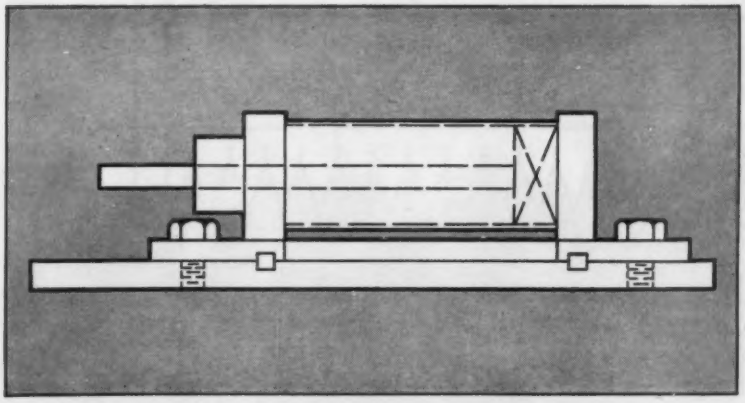


Fig. 3. A trunnion mounting is an improvement over that shown in top figure

Fig. 4. Keys should be used besides the hold-down bolts to help absorb shock



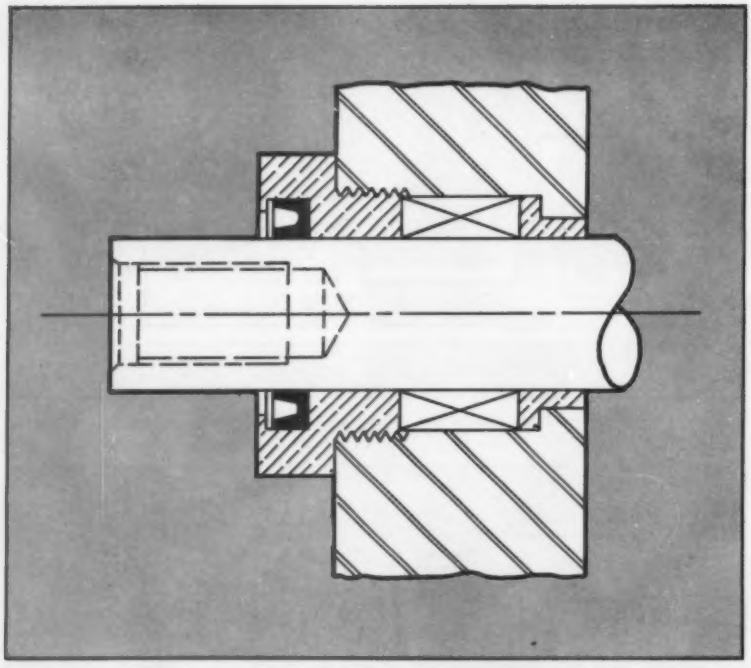


Fig. 5. Scraper for removing residue that may collect on rod of a pneumatic piston

upon the service requirements. In instances where piston rods are subjected to weld spatter, falling objects, or intense heat, some preparation should be made to shield them. This is not always an easy matter, but the rod should have protection if any kind of life is to be expected from the packings. In some instances it may be necessary to install a collapsible type shield in order to protect the rod. Where intense heat is involved, asbestos or some other heat barrier should be used.

4. When the end of the piston rod is connected to some device or machine member, make certain that it is securely locked. Although cylinder manufacturers use the nomenclature "non-rotating," it does not mean that the piston rod will not turn when it travels from one end of the stroke to the other.

5. When installing rotating cylinders on a lathe spindle or other rotating spindle, see Fig. 7, first mount the cylinder adapter on the spindle and lock securely. Check the adapter pilot with an indicator for runout. Next, screw the drawbar into the piston rod of the cylinder when the piston is in the forward position. Attach cylinder to cylinder adapter with suitable cap screws. Check the OD of cylinder for runout with an indicator. If the runout is more than .003 in., the cap screws should be loosened and the cylinder tapped lightly to bring it within .003-in. allowable runout and the cap screws again tightened. Then, runout should be given another check.

6. Although, not always possible, cylinders should be mounted so that they are readily accessible for servicing. This will make it much easier for the maintenance man. So often we find that even to identify a cylinder so that repair parts can be ordered, the maintenance man must go through gymnastics and even use mirrors to locate the serial number on a cylinder.

7. Should there be any rust, residue, or preservative on the piston rods make certain that it is removed before the cylinder is placed in service.

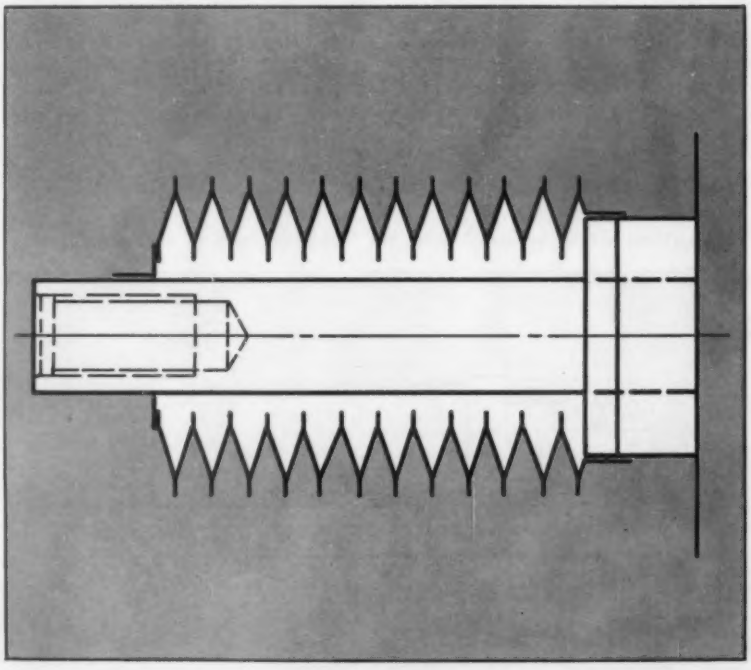
Proper mounting or placing of the controls in any pneumatic circuit is very important. Control valves equipped with mounting pads should be securely mounted on a flat surface so as not to distort the valve body. Many failures are caused by the improper location of valves in circuit.

There are a number of other items the installer should keep in mind when placing controls in a system: 1. Install a device for filtering, lubricating, and regulating the compressed air at the entrance to each pneumatic system. Where excessive condensation is present in the compressed air lines, water traps should be installed. This allows clean, lubricated air to enter each pneumatic circuit which will greatly increase its efficiency. Many times companies will try to eliminate this added expense with the result that the added maintenance and down time will quickly exceed the original cost of the regulating, filtering, and lubricating unit.

The lubricator must be mounted in a vertical position. Where a combination lubricator, filter, and regulator is used, it is often mounted on a plate or in a panel as shown in Fig. 8.

2. Mount valves that have an adjustment, such as flow control, sequence, pressure control, and so forth

Fig. 6. A diaphragm type piston rod cover for protection from dusty atmosphere



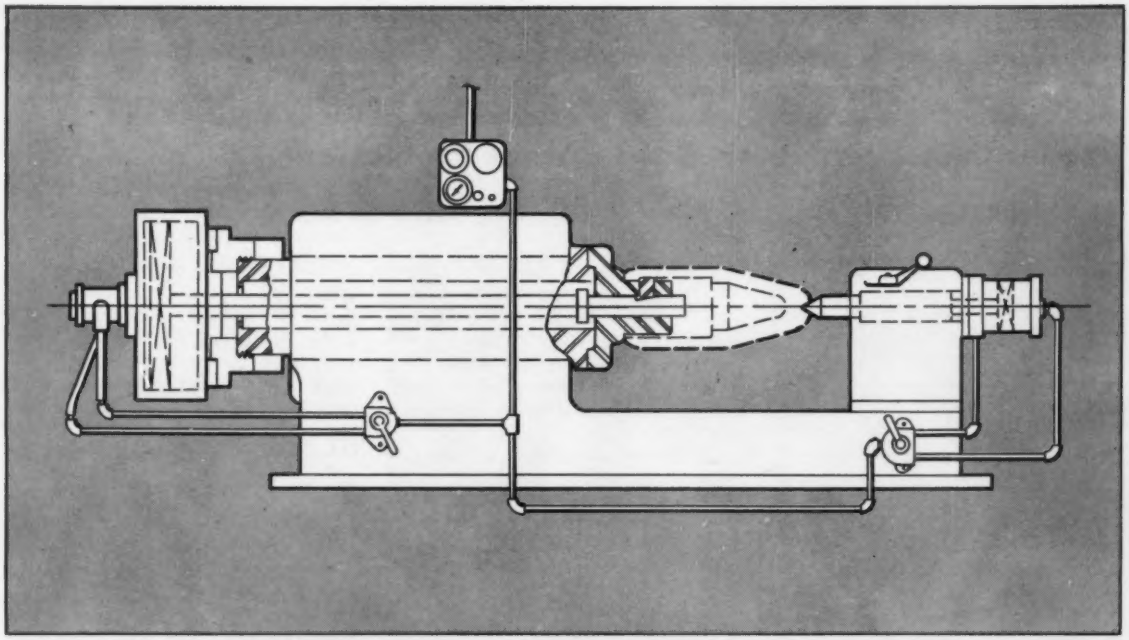


Fig. 7. At lathe's left is a rotating cylinder attached to the headstock spindle. At right is a double-acting unit

in a location where they are readily accessible. They should be high enough off the floor that they will not be hit by a fork truck or tote boxes. The locking wires or seals should not be applied until the equipment is put into operation and approved for the production run.

3. On small two-way solenoid operated valves in which the end of the solenoid plunger acts as the closing plug, make certain that the valve is mounted so that the plunger is in a vertical position.

4. Where a safety circuit is involved, mount the controls so that the operator must keep both hands occupied while the piston rod of the cylinder is moving out. Place the controls so that he cannot knee them or place a stick across them and work the two controls with one hand.

5. Protect external moving parts of the control valves from paint and foreign matter during the installation period. Heavy wrapping paper securely tied or taped over the moving parts usually provides ample protection. Any protective coating applied by the manufacturer before shipping from his factory should be removed from the valves before placing them in operation.

6. When system is installed make certain that all exhaust ports are open. It is recommended that mufflers be installed to exhaust connections wherever possible. In some installations it is wise to connect all the exhausts to a common manifold and then place a large muffler at the end. Sometimes the manifold is piped to the outside of the building. When connecting exhausts to a manifold, it is imperative that no back pressure is created as it can quickly and unfavorably affect a circuit. Exhaust mufflers are especially desired where there are a number of air operated machines located in close quarters as the escaping exhaust air is quite noisy and operators really set up a complaint until mufflers are installed.

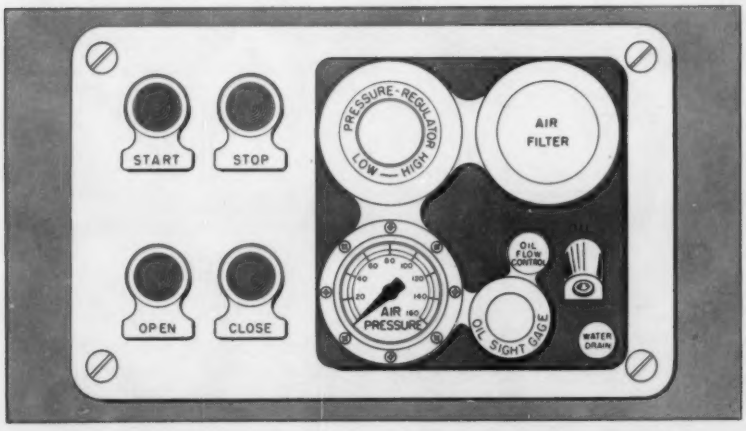
7. In circuits requiring a large amount of compressed air for fast cycling, the use of a storage tank at the beginning of the circuit will be a big help. These storage tanks can be simply constructed. Often a large piece of pipe capped on both ends with one inlet will be all that is needed.

8. When solenoid valves are installed, check the voltage required for the solenoid coils before makjng electrical connections.

9. Keep control valves away from intense heat whenever possible. Most valves contain packing of some type and intense heat has a very detrimental effect on most packing. If it is necessary to use valves in "hot spots," be sure to specify high temperature seals and then protect the valves from heat after they are installed in the circuit.

Often, too little thought is given to the installation of the piping in a pneumatic system. After all of the valves, cylinders, lubricating units, and so forth are placed in their proper

Fig. 8. Panel setup for pneumatic filter, regulator, and lubricator station



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Fuses—What They Can Do for You

Proper Selection Means Good Circuit Protection

By J. C. LEBENS, Vice President in Charge of Engineering, Bussmann Mfg. Co.

TODAY, THE plant engineer has at his fingertips many types of low voltage cartridge fuses with widely different electrical characteristics which, if properly applied to his circuits, not only can give short circuit protection but also can give added protection as well. To get the most out of fuses requires an appreciation of them and how they can protect your equipment.

All low voltage cartridge fuses fall into the broad classification of the National Electric Code. They are rated at 250 volts or less and 600 volts or less and the dimensions are as shown in Table I. Hence, it might be assumed that all the fuses do the same job—but this is only part of the story.

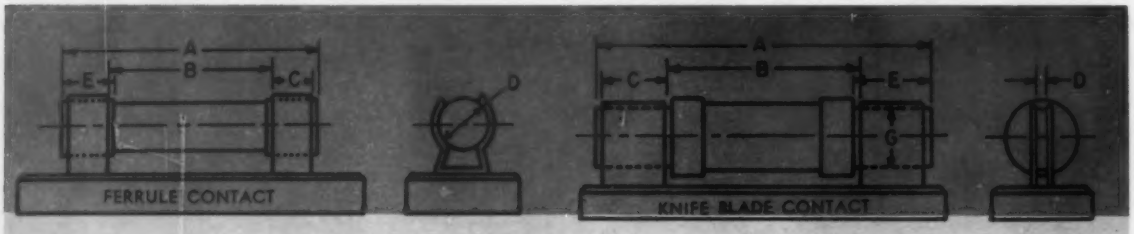
The development of low voltage fuses has progressed in several directions to give the plant engineer extra protection. Originally the one-time or non-renewable cartridge fuse met the requirements of the electrical distribution system. It consisted of a zinc link connected to two terminals, surrounded by an arc-quenching filler, and enclosed in an insulated case. This fuse will carry its rating satisfactorily and will safely interrupt a 10,000 amp d-c short circuit.

In the old days, such a fuse was satisfactory because usually the circuit capacity exceeded the load and the load consisted of lamps or heaters with very small overloads. Hence, whenever the circuit was overloaded, a fault condition existed which would cause the fuse to open.

However, as the loads grew and, in many cases, became predominately motor loads, the application of the ordinary non-renewable fuse offered problems. Overloads on the circuit caused by motors starting would cause the fuse to open unless starting shunt switches across the fuses were added or unless the size of the fuse was increased so that it could carry these harmless overloads. The only trouble is that, increasing the fuse size, leaves a blank in the protection picture because these same overloads, when caused by a fault condition, can persist and destroy the circuit without blowing the oversize fuse. Protection in this range must be obtained by some other device if complete circuit protection is to be realized.

The greatly increased use of electrical power further complicates the protection picture because, as the system grows, the possible short circuit currents which might flow under fault conditions increases greatly. Today short circuit currents of 25,000 amps are not uncommon and some very large systems can deliver currents larger than 100,000 amps. Such currents may cause the fuse itself to blow or, even if the fuse clears the short

Table I. Dimensions of cartridge-enclosed fuses with ferrule or knife blade contacts are shown for voltages indicated



Voltage	Rated Capacity	A Length over Terminals	B Distance between Contact Clips	C Width of Contact Clips	D Diameter of Ferrules or Thickness of Terminal Blades	E Min. Length of Ferrules or of Terminal Blades outside of Tube	G Width of Terminal Blades
	Amperes	Inches	Inches	Inches	Inches	Inches	Inches
FERRULE CONTACT							
Not over 250	0–30	2	1	1/2	9/32	1/2	—
	31–60	3	1 3/4	5/8	13/32	5/8	—
Not over 600	0–30	5	4	1/2	13/32	1/2	—
	31–60	5 1/2	4 1/4	5/8	1 1/32	5/8	—
KNIFE BLADE CONTACT							
Not over 250	61–100	5 3/8	4	7/8	1/8	1	3/4
	101–200	7 1/8	4 1/2	1 1/4	7/32	1 3/8	1 1/8
	201–400	8 5/8	5	1 3/4	1/4	1 7/8	1 5/8
	401–600	10 3/8	6	2 1/8	1/4	2 1/4	2
Not over 600	61–100	7 3/8	6	7/8	1/8	1	3/4
	101–200	9 5/8	7	1 1/4	7/32	1 3/8	1 1/8
	201–400	11 5/8	8	1 3/4	1/4	1 7/8	1 5/8
	401–600	13 3/8	9	2 1/8	1/4	2 1/4	2

circuit safely, switches or starters in the circuit may be damaged by the magnetic forces produced by the short circuit.

Fortunately, all fuses are current-limiting so that the picture is not as black as it appears on the surface. In other words, if an ordinary 30 amp non-renewable cartridge fuse were subjected to a 100,000 amp short circuit, the fuse would blow before the current could build up to 6000 amps. It is true the fuse itself might blow on such a test, but the rest of the circuit would not be subjected to magnetic forces greater than that associated with 6000 amps during the fault.

However, roughly speaking, for any given type of fuse the larger the ampere rating, the more short circuit current the fuse will permit to flow. Hence, if it is necessary to increase the one-time fuse size to carry the starting currents of the motors connected to the circuit, the short circuit current which the fuse permits to flow is increased correspondingly so that the danger of trouble on high fault currents is aggravated.

The current-limiting cartridge fuse was developed to correct this situation. It employs a silver link instead of the zinc link used in the ordinary non-renewable fuse and the link is designed to blow extremely fast on short circuit. By such construction it is possible to make a fuse which will safely interrupt short circuit currents greater than 100,000 amps so rapidly that very little current actually flows in the circuit. For this reason, the magnetic stresses on the switches and starters in the circuit are held to a minimum and the danger of damage practically eliminated.

However, it must be remembered that the current-limiting silver link fuse is extremely fast-acting so that its rating must be selected large enough to prevent its blowing when the motors are started on the circuit. Some other form of protection must be provided to protect the circuit from full load to the load at which the fuse will blow.

The other direction in which fuses progressed when circuits became loaded more and more with motors and similar devices was to alter the electrical characteristics of the fuse to more nearly match the characteristics of the load it was called upon to protect. Under normal, safe operating conditions the current can vary within extremely wide limits without injuring the equipment, as long as the current is not permitted to flow longer than a predetermined, safe time. Under faulty, or dangerous operating conditions, these same currents are maintained long enough to damage, if not

(Continued on page 259)

Table II. Recommended sizes of dual-element fuses for various motor loads

Amperes of motor or device	Ampere rating				Amperes of motor or device	Ampere rating			
	Ordinary service	Heavy service	Maximum Size 40 C Motor*	Maximum Size All other Motors		Ordinary service	Heavy service	Maximum Size 40 C Motor*	Maximum Size All other Motors
1.01 to 1.04	1	1.125	1.4	1.25	14.3 to 15.2	15	17.5	20	17.5
1.05 to 1.08	1.125	1.25	1.4	1.25	15.3 to 15.6	15	17.5	20	20
1.09 to 1.14	1.125	1.25	1.4	1.4	15.7 to 17.8	17.5	20	20	20
1.15 to 1.17	1.125	1.25	1.6	1.4	17.9 to 20.8	20	25	25	25
1.18 to 1.21	1.25	1.4	1.6	1.4	20.9 to 21.4	25	25	25	25
1.22 to 1.28	1.25	1.4	1.6	1.6	21.5 to 21.7	25	25	30	25
1.29 to 1.30	1.25	1.4	1.8	1.6	21.8 to 24.9	25	30	30	30
1.31 to 1.39	1.4	1.6	1.8	1.6	25.0 to 26.0	25	30	35	30
1.40 to 1.42	1.4	1.6	1.8	1.8	26.1 to 28.5	30	35	35	35
1.43 to 1.46	1.4	1.6	2	1.8	28.6 to 30.4	30	35	40	35
1.47 to 1.56	1.6	1.8	2	1.8	30.5 to 32.1	35	40	40	40
1.57 to 1.60	1.6	1.8	2	2	32.2 to 34.7	35	40	45	40
1.61 to 1.66	1.6	1.8	2.25	2	34.8 to 36.0	35	40	45	45
1.67 to 1.73	1.8	2	2.25	2	36.1 to 39.1	40	45	50	45
1.74 to 1.80	1.8	2	2.25	2.25	39.2 to 41.2	40	45	50	50
1.81 to 1.87	1.8	2	2.5	2.25	41.3 to 42.8	45	50	50	50
1.88 to 1.95	2	2.25	2.5	2.25	42.9 to 43.4	45	50	60	50
1.96 to 2.00	2	2.25	2.5	2.5	43.5 to 46.0	45	50	60	60
2.01 to 2.08	2	2.25	2.8	2.5	46.1 to 49.9	50	60	60	60
2.09 to 2.17	2.25	2.5	2.8	2.5	50.0 to 51.0	50	60	70	60
2.18 to 2.28	2.25	2.5	2.8	2.8	51.1 to 52.1	60	60	70	60
2.29 to 2.34	2.25	2.5	3.2	2.8	52.2 to 57.1	60	70	70	70
2.35 to 2.43	2.5	2.8	3.2	2.8	57.2 to 60.0	60	70	80	70
2.44 to 2.56	2.5	2.8	3.2	3.2	60.1 to 64.2	70	80	80	80
2.57 to 2.60	2.5	2.8	3.5	3.2	64.3 to 69.5	70	80	90	80
2.61 to 2.78	2.8	3.2	3.5	3.2	69.6 to 72.0	70	80	90	90
2.79 to 2.85	2.8	3.2	3.5	3.5	72.1 to 78.2	80	90	100	90
2.86 to 2.91	2.8	3.2	4	3.5	78.3 to 78.5	80	90	100	100
2.92 to 3.04	3.2	3.5	4	3.5	78.6 to 82.0	80	90	110	100
3.05 to 3.21	3.2	3.5	4	4	82.1 to 86.9	90	100	110	100
3.22 to 3.33	3.2	3.5	4.5	4	87.0 to 89.2	90	100	110	110
3.34 to 3.47	3.5	4	4.5	4	89.3 to 91.5	90	100	125	110
3.48 to 3.60	3.5	4	4.5	4.5	91.6 to 95.6	100	110	125	110
3.61 to 3.64	3.5	4	5	4.5	95.7 to 100	100	110	125	125
3.65 to 3.91	4	4.5	5	4.5	101 to 108	110	125	125	125
3.92 to 4.00	4	4.5	5	5	109 to 114	110	125	150	150
4.01 to 4.16	4	4.5	5.6	5	115 to 124	125	150	150	150
4.17 to 4.34	4.5	5	5.6	5	125 to 130	125	150	175	150
4.35 to 4.48	4.5	5	5.6	5.6	131 to 142	150	175	175	175
4.49 to 4.68	4.5	5	6.25	5.6	143 to 152	150	175	200	175
4.69 to 4.86	5	5.6	6.25	5.6	153 to 160	175	200	200	200
4.87 to 5.00	5	5.6	6.25	6.25	161 to 173	175	200	225	200
5.01 to 5.20	5	5.6	7	6.25	174 to 177	175	200	225	225
5.21 to 5.43	5.6	6.25	7	6.25	178 to 180	200	225	225	225
5.44 to 5.71	5.6	6.25	7	7	181 to 195	200	225	250	225
5.72 to 5.82	5.6	6.25	8	7	196 to 200	200	225	250	250
5.83 to 6.08	6.25	7	8	7	201 to 214	225	250	250	250
6.09 to 6.42	6.25	7	8	8	215 to 217	225	250	300	250
6.43 to 6.50	6.25	7	9	8	218 to 230	225	250	300	300
6.51 to 6.95	7	8	9	8	231 to 249	250	300	300	300
6.96 to 7.20	7	8	9	9	250 to 260	250	300	350	300
7.21 to 7.28	7	8	10	9	261 to 285	300	350	350	350
7.29 to 7.82	8	9	10	9	286 to 304	300	350	400	350
7.83 to 8.32	8	9	10	10	305 to 321	350	400	400	400
8.33 to 8.57	9	10	10	10	322 to 347	350	400	450	400
8.58 to 8.69	9	10	12	10	348 to 350	350	400	450	450
8.70 to 9.36	9	10	12	12	351 to 360	400	450	450	450
9.37 to 10.4	10	12	12	12	361 to 391	400	450	500	450
10.5 to 10.7	12	12	12	12	392 to 400	400	450	500	500
10.8 to 12.4	12	15	15	15	401 to 428	450	500	500	500
12.5 to 13.0	15	15	17.5	15	429 to 434	450	500	600	500
13.1 to 14.2	15	17.5	17.5	17.5	435 to 460	450	500	600	600

*This applies to motors marked to have a temperature rise not over 40 C. All other motors take maximum shown in fourth column.

If two ampere ratings are shown on motor, check voltage of power supply to motor.

Fig. 1. (Above) Two fans, handle total of 375,000 cfm

Fig. 2. (Right) shows fan receiving final balance. One pick up (arrow) can be seen on a bearing support structure

For the Final Touch— Fans Are Balanced In The Field

By A. P. ROSENQUEST, Chief Engineer
Chicago Blower Corp., Franklin Park, Ill.

COMPLETE AIR conditioning system of nearly 1000 tons capacity has been installed in a specially built penthouse atop an existing four-story section of the *Register and Tribune* newspaper building in Des Moines, Iowa. The system serves the entire building, including the press room.

One central fan system consisting of two Chicago Blower Corp. double width air foil type fans, handles the total load of 375,000 cfm. Driven by 150-hp motors, the fans operate at 425 rpm with a mechanical efficiency in excess of 90 per cent. Fan rotor assemblies are 87 in. in diam and weigh more than 2500 lb each.

Because of their size and location, Chicago Blower planned on balancing the fans after installation, although they were balanced prior to shipment from the plant.

As one of the fans was damaged during shipment, it became absolutely necessary that the fans should be rebalanced.

For this job, a portable balancing machine made by Tinius Olsen was used. The 31-lb unit consists of three main components: vibration pickup, amplifier and indicating unit. The pickup is a tunable vibrating reed which has a magnet at the end of the reed moving in a variable inductance coil.

Manual Control

By adjusting the length of the reed manually it is tuned to resonance with any given vibration isolating all others. The amplifier and indicating unit will show a reading of 1200 mv at an amplitude of 0.001 oz in. at a frequency of 60 cycles per second. The "strobe" light, actuated by the pickup "freezes" the rotating part when tuned to resonance and is used to vector the unbalance. Both dynamic and static unbalance are easily found.

Thus by placing a pickup on the bearing supports at each end of the fan housing, the fans were balanced. Proper adjustment of the crank on top of the pickup unit (see Fig. 2) automatically filtered out all vibrations other than those occurring at fan speed. For instance, speed of the motors driving the fans was 900 rpm, but any unbalance which might have been in the motors, was automatically filtered out so that there was no interference with the balancing of the fans.

By means of a selector switch, the amount of unbalance from each pickup was shown in the center dial of the instrument, while the strobe light "stopped" a preplaced reference mark locating the position of the unbalance in the fans.

By the correct addition or deduction of weight in two pre-selected planes of the running part, the fans were accurately balanced.

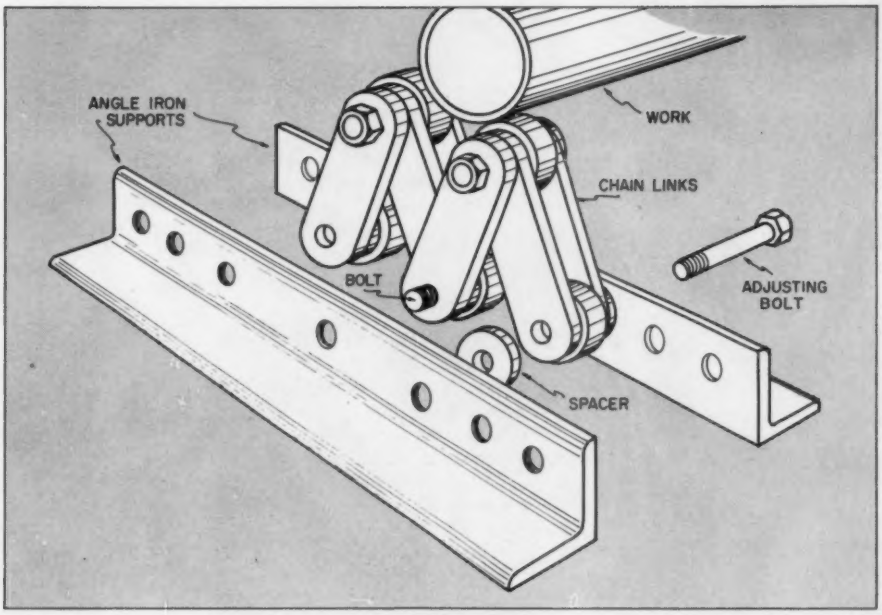


Fig. 1. Chain links, bolted between angle iron supports, function as an adjustable pipe cradle

Chain Link Gadgetry

Conveyor Chain "Rides Again" in Jigs and Fixtures

Contributed by F. E. Riley, Mechanical Engineer

LENGTHS, OR LINKS, of standard conveyor chain should not be considered expendable — they can be useful elements from which various economical devices may be built. This article describes some of these uses, which the author has found particularly applicable to maintenance and installation work.

The type of conveyor chain used for the devices described consists of mild steel rollers which may be mounted on hollow or solid bearing pins. The links can be 3-, 4- or 6-in. pitch. Most useful is the hollow bearing pin chain link, through which a bolt can be passed.

It should be remembered that the hollow bearing pin chain must have support against lateral movement since the chain is usually designed for tensile stresses. Most of the devices described will subject the chain to compressive stresses well within the strength of the chain elements.

Applied to the handling of pipe, an adjustable cradle on which lengths of pipe can be revolved and supported is illustrated in Fig. 1. The cradle was constructed primarily for welding flanges and fittings to the ends of steel pipe; the pipe rests on the two upper rollers and can be rotated so that the welder can work downhand. One of the cradle units is used at each end of the pipe.

Each cradle required four links of conveyor chain, three bolts and two lengths of angle iron. Hollow bearing chain links are used and the lower center bolt passing through the hollow pin holds the assembly permanently together. Moving the outer links so that their lower pins are aligned with different holes in the angle iron increases or decreases the capacity of the cradle to suit any pipe diameter. The larger the pipe, the further apart the two upper rollers. The larger pipe will be the heaviest, and as the outer links are spread further apart, the links will sink between the vertical face of the angle iron, gaining additional lateral support. Spacing washers are needed to make up the space between the angle supports; these can be several stock washers, pieces of plate cut to size, or ends from side links.

Using 6-in.-pitch chain links, the maximum diameter accommodated by the pipe cradle in Fig. 1 is approximately two feet. For larger diameters, the cradle shown in Fig. 2 can be used. It consists of a welded structural channel frame, with its two uprights joined by a length of conveyor chain. If hollow bearing pins are used for the end links of the chain, the sag in the middle can be adjusted to suit the pipe diameter. The sag is important; if it is too great, the work may rub on the chain links instead of touching only the rollers.

Where very heavy circular sections are supported, it may be advisable to employ three or more cradles, spaced

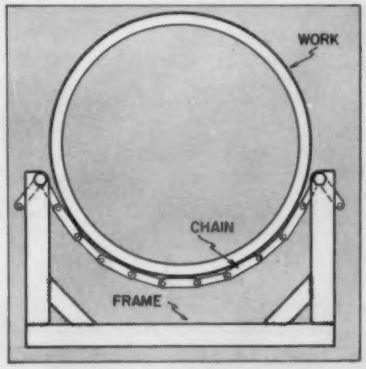


Fig. 2. Length of supporting chain in this fixture is adjustable to fit work

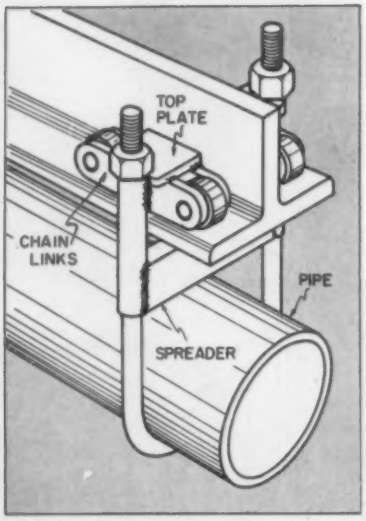


Fig. 3. Conveyor chain rollers provide mobility to fabricated pipe hangers

along the length. Lateral stability of the cradles can be achieved if they are anchored firmly to the floor or fitted with feet to increase the floor area covered by the cradle base.

An efficient pipe hanger, which will allow pipe to move freely in expansion and contraction, was made from standard chain links, as illustrated in Fig. 3. The pipe is supported by an overhead I-beam which forms a track on which the rollers can travel.

The chain link side plates are strengthened by welding them together with a top plate, and steel tubes, set vertically, are welded to the sides. The tubes are joined together at the lower ends by a welded plate, to prevent the links from spreading to the point where the trolley leaves the rail. A large U-bolt supports the pipe—its legs are guided and supported by the side tubes. The height of the pipe can be set by adjusting the nuts on the U-bolt.

A similar form of construction can be adopted for making economical overhead traveling trolleys for light lifting and for the suspension of power tools over assembly lines. Tracks can be of I-section or inverted T-section structurals.

Application of a single link of chain is illustrated in Fig. 4. This is a simple roller support to hold up the outer end of a heavy door, to prevent its catching the floor as it is opened or closed. The side links have been fitted with L-section lugs, welded in place; these are a standard conveyor chain fitting. The door support is limited in use, however, to floor surfaces that are hard and smooth, unless a curved track of flat steel for the roller is set into the floor surface.

Placing heavy shafts between the centers of a lathe where no lifting device is available can be a difficult job. In fact, a lightweight shaft over two feet in length is usually more than one man can handle conveniently. The lathe operator cannot make adjustments to centers or steady rests on centered barwork, because of the danger that the center will become disengaged and the job drop to the bed of the machine.

Placing the work in a pair of cradles on the lathe bed enables one man to load shafts—all he has to do is lift the work and drop it on the cradles, where it is safely supported. With the type of cradle shown in Fig. 5, the work can be raised or lowered to suit different end diameters on one shaft.

The usual procedure is to adjust the cradles so that the work axis is just below the lathe center axis. Bringing up the tailstock to engage the centers raises the work clear of the cradles. The cradles stay in position on the lathe bed, in many cases, while the work is being machined.

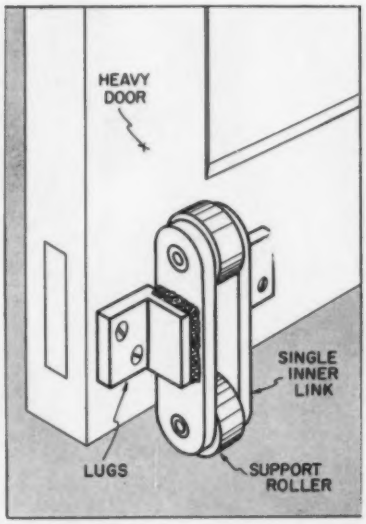


Fig. 4. Door roller, formed from chain link, carries weight of heavy plant door

Four links of chain are used in the cradle. The outer links are drilled to take a trunnion nut at one end and a plain trunnion support at the other. A long screw runs through the chain links and raises or lowers the two work supporting rollers. The rollers also become more widely spaced to support larger diameters as they are lowered.

To give side support to the links, and to provide a smooth track on which the bottom rollers can ride, a channel base encloses the assembly.

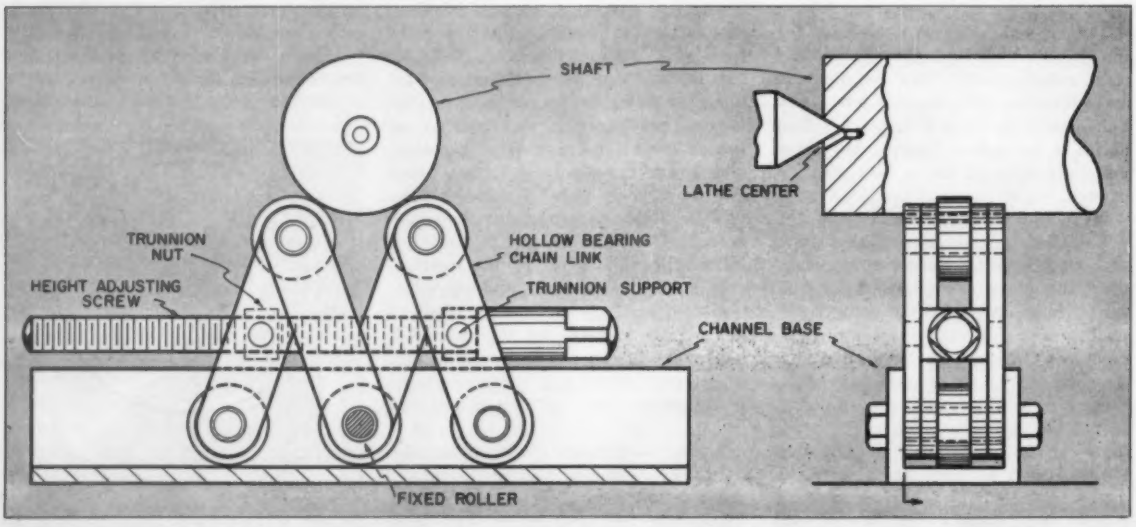


Fig. 5. Designed for use on lathe, adjustable work holder positions heavy lengths of shafting for pickup by lathe centers

Making Test Fixtures?

Here's How Pastushin Aviation Saves Money by Investigation of Future Needs and Present Standardized Equipment

By O. H. JACOBSON, Chief Technical Engineer, Pastushin Aviation Corp., Los Angeles, Calif.

Preparing to raise tank and ejection gun so that high speed motion pictures may be made of its fall after ejection. Proper research prior to building indicated proper height for fixture if it was to meet future product needs

THIS ARTICLE IS not written with the thought that other plant engineering departments will want to duplicate exactly the test equipment we have constructed for use in research and development work at Pastushin Aviation Corporation, Los Angeles, California. Rather, we want to explain the problems encountered during the design and construction of this test equipment, and how these problems were solved. It seems quite obvious to us that *any* plant engineering department faced with the job of designing and building structural test equipment and facilities will be faced with similar problems and will have to employ similar techniques to solve them.

When our Plant Engineering Department receives an order to design and build a piece of test equipment, it must be handled differently than an order for an addition to a stock room, new tanks in the metal cleaning department, or a production line modification. The Project Engineer assigned just can't take the order to his drafting board, consult the necessary handbook data, then return with a complete set of blueprints and specifications for the job. Test equipment involves too many variable and intangible factors for this sort of treatment.

Here at Pastushin Aviation, definite procedures are followed before a pencil ever touches the drawing board. And it can be pointed out that, despite the relatively small size of the company, structural test facilities have been designed and erected that have received unreserved approbation from one of the Nation's most critical customers—the United States Air Force.

First, let us define the type of test equipment about which we are speaking. This equipment is the test stands, static test structures, pressure application equipment, vibration equipment, etc., used to subject a specific line of products to the various static, dynamic, and environmental tests necessary to pre-establish its value and service life under operating conditions. These types of test structures vary more or less from product to product despite the fact that standard instrumentation may be used on all of them to evaluate the results.

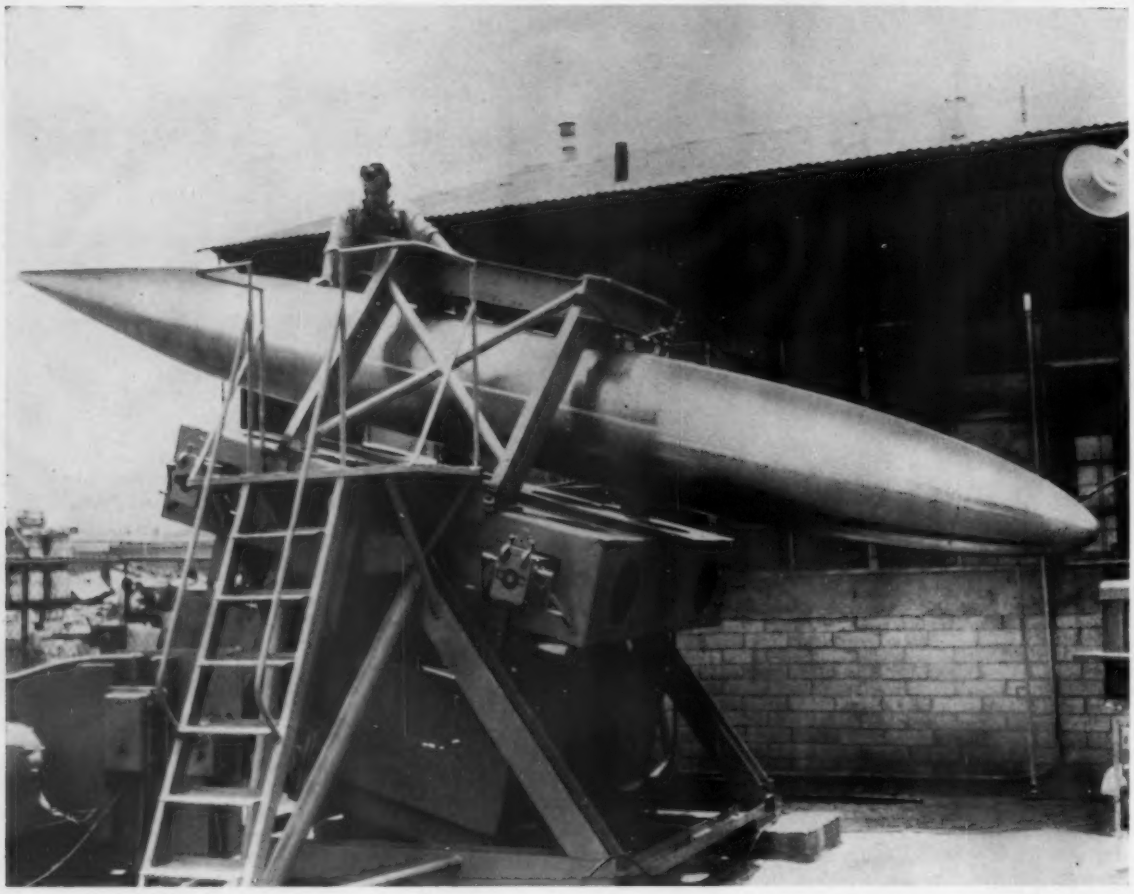
A commercial manufacturing company conducts such tests so that it can extend service guarantees to its customers, and so that it can improve the quality of its product to meet competition. Companies producing military products of any sort are forced to run these tests to comply with military specification requirements. In either case, the end results are the same—a better product that will render specific services under specific operating conditions.

With competition what it is today, and with military specifications governing the product output of many firms, more and more companies are being faced with the problem of erecting efficient and comprehensive test structure facilities. Our company was no exception. Our one advantage stems from the fact that management recognized very early the need for an efficient and comprehensive testing program, and acted accordingly.

This brings us directly to the problems that must be solved before the test structures are designed and built. First and foremost, is management recognition of the need and a specific budget to cover the costs. Efficient test structures just can't be eked out of the petty cash drawer, so to speak. The engineering department must have a definite budget to work with so that it can strike a logical balance between test requirements and the amount of money available to meet these requirements.

Secondly, the design of the products to be tested should be well solidified before the test structure is built. While some test structures, such as those used for static testing, could be built almost "universal" in application, such versatility costs money. For the average small company embarking on a test fixture program, the best bet is to limit the versatility of all test structures to the testing of the product to be produced along with evolutions or modifications that may occur in that product during normal research and development work.

Pastushin Aviation is a leading manufacturer of external dropable fuel



Vibration table test fixture designed by Pastushin's plant engineering staff after thorough research of field to determine characteristics of fixtures on market designed to do similar job. Why build specials if standard fixtures will do?

tanks for military airplanes. At one time, all of these tanks were made of light metal and only gravitational force was employed when they were dropped. The Korean war proved that both the material being used and the method for dropping the tanks was far short of perfect. The metal tanks were easily dented during shipment and handling, and metal corrosion was a serious problem. And when these tanks were "dropped" from an airplane traveling hundreds of miles per hour, and with only gravitational forces to cause separation between the airplane and dropped tank, the tank did not always drop cleanly, but might strike against the airplane wing, fuselage, or tail structure.

To study these problems, Vic Pastushin himself, company founder and president, visited the Korean war front. He was soon convinced that GFR (glass-fiber-resin) all-plastic fuel tanks would solve both the denting and corrosion problems. He was further convinced that the tank dropping problem could be solved by using a powder-filled cartridge and ejection gun that would literally "shoot" the tank clear of the airplane's path.

Up until that time we had been hiring outside test facilities to test our products. But when Vic Pastushin returned from Korea with the idea of improving the metal tanks, and developing ejection guns and all-plastic tanks, it was apparent the company would need its own test facilities. Thus with the design (or in this particular case, an idea) firmly established, money was appropriated to start the test structure program.

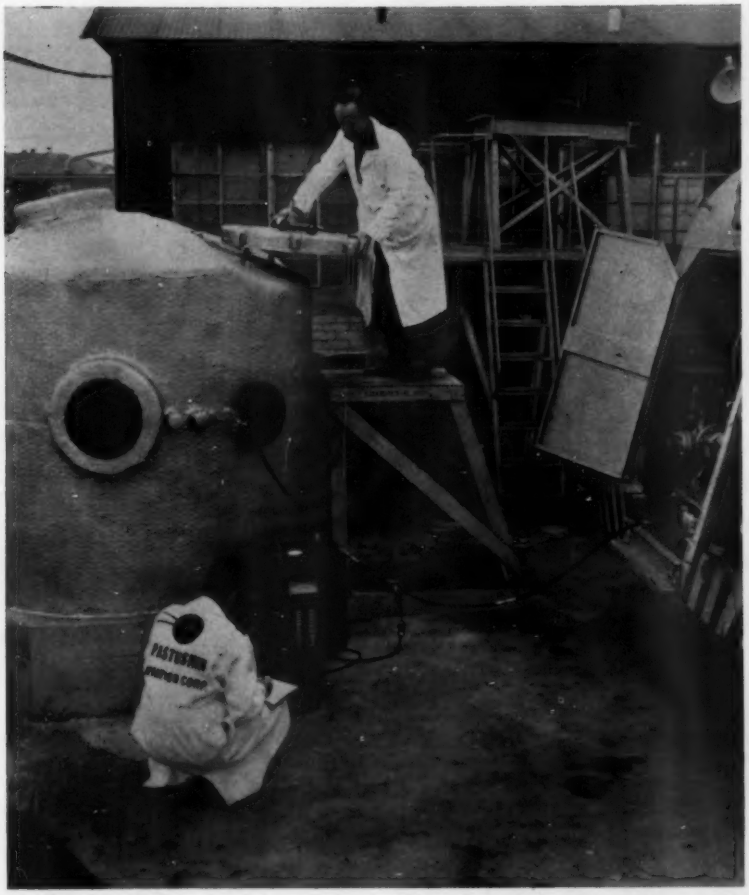
The test structure program was not deposited wholly in plant engineering's lap. It became a problem involving many departments, including the design engineers, the laboratory, the experimental division, and even the plant maintenance department to accomplish the labor. Of course, the plant engineers produced the blueprints and specifications, but only after intimate cooperation with all other departments to assure that a specific fixture could be produced that would accomplish specific results within a specified cost outlay.

Principle test fixtures for this program included a tank ejection stand, a vibration table, a static test structure, an altitude and temperature chamber for environmental tests, and a portable trailer equipped with instrumentation so that it could be moved about at will and even into the field for field testing. This latter, of course, was to avoid the cost of permanently installed instrumentation on each test fixture of the instruments that could be used interchangeably.

We are firmly convinced that the problems we faced in designing and building this rather conventional array of test equipment are comparable to the problems that will be faced by any company entering upon a test structure program.

We'll take the vibration table as the first example. The field of vibration tables was first thoroughly researched to determine the types of tables in use, and the advantages and shortcomings of each.

What we needed was a big vibration table which could transmit vibratory forces of considerable amplitude to an



Altitude and temperature chambers are low in cost compared to their refrigeration systems and vacuum pumps, so build for maximum pressure, temperature

ejection tank that, when filled with water, would weigh about 4200 lb.

Our research indicated that a number of large vibration tables were in use, but that all of them started to vibrate the moment they were turned on, and continued to vibrate as they gained speed to the required frequency. This meant that if both the table's and tank's natural frequencies lay anywhere below the required test frequency, there would be a moment while the table was coming up to the required speed. Also, that when these natural frequencies were reached, the amplitude of vibration would be great enough to cause more damage than the required 25 hours of vibration at the specification frequency.

Solution to this problem, once its existence was determined, then became a matter of engineering ingenuity. The four weights at the four corners of the table which impart the vibratory forces were designed so that they could be centered on the shaft while the table was gaining speed. Thus, they would rotate "in balance" and would not impart vibratory forces to the table. When the table reaches the required frequency, merely throwing a lever actuates the weights into an eccentric position on their shafts, and the vibratory forces are applied in a normal manner.

This simple example leads to an obvious axiom—when designing a test fixture, investigate similar fixtures already in use. Determine the advantages and shortcomings of each. Then design to include the advantages and overcome the faults. Such information is not available in engineering data books. Pre-design research is the only way to ferret it out.

As a second example of "How to Avoid Errors and Save Money in Test Fixture Design," let's turn to the Pastushin tank ejection test stand. This stand is constructed so that the fuel tank along with the ejection gun and its pylon (the fairing that surrounds the ejection gun) can be mounted on it for experimental ejection.

Minus exhaustive pre-design research, it would have been normal procedure to build this ejection stand so that the guns and tanks could have been mounted from the ground level, or even so that the tanks would be ejected in a horizontal direction at ground level. In either case, tests on the ejection gun itself would have been comprehensive and acceptable. But in this case close cooperation with our customer, the USAF, revealed that more information was needed. It would be necessary to take high-speed motion pictures of the tank to determine its position immediately after ejection. This made it necessary to eject the tank some distance above the ground. As a result of this requirement, our tank ejection stand test fixture was built 20 ft high and includes both ground level, midway, and top mounting facilities.

Consider Future Needs

If we had hurried through a ground level test stand, we would have been faced with erecting a higher test stand for the required tank altitude (after ejection) motion picture information. Cost of two test stands would have been much too high for our single facility. So specific customer needs and requirements must be taken into consideration during test fixture design.

As a third example, we'll use a static test fixture erected to test the static loads the tanks would withstand. Static test fixtures are so common and conventional that about the only problem involved is how big to build them. A static test fixture used for loading an entire airplane wing or fuselage could, conceivably, be used for loading a fuel tank. But both the investment and space requirements would be disproportionate for the size of the product.

On the other hand, labor is the major cost in erecting a static test fixture. It hardly costs more to rivet or weld a 15-ft steel beam in place than a 10-ft steel beam. The only additional cost is the extra five feet of material. So when we designed our static test structure, we made it big enough to accommodate 1000-gal fuel tanks although a 450-gal fuel tank seemed big at the time. Now there is good evidence that ejection tanks will soon be much larger than those currently being produced. If this happens, we will be ready for them.

Here again a simple axiom is almost self-evident — when labor constitutes the major cost of a test structure, and when increasing the size and versatility of the structure will not materially affect these labor costs, it's probably wise to build farther into the future.

Air Force specification requirements for practically any product to be tested in a temperature and altitude chamber usually lie between plus 200 F and

(Continued on page 260)

What Makes the Flexible Plant?

At Johnson & Johnson's New Plant It Takes Three Things: Special Machine-Moving Dollies; Flexible Hose Connections and Machine-Leveling Mounts

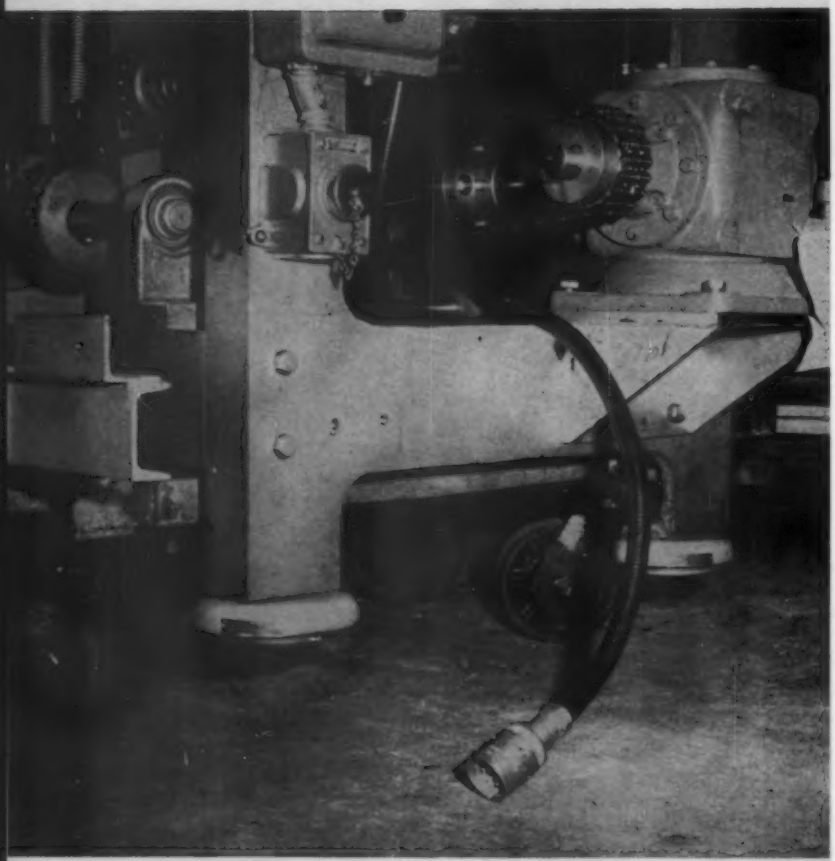


Fig. 1. Grouped in this picture are the three elements of Johnson & Johnson's "flexible plant": the machine-moving dolly underneath the production unit; the leveling mounts; and the flexible hose and connection for power, water and air

FLEXIBILITY AND mobility have become bywords to the engineering staff of Johnson & Johnson, well known manufacturers of drug trade products. These concepts have been adopted by the Company to streamline production operations in many of its diversified activities.

An outstanding example of how flexibility and mobility fit into the Johnson & Johnson operations plan can be seen in the production set-up of the Company's surgical dressing division. A new, modern, one-story plant built for surgical dressing output is designed and constructed around the theme of "flexible production lines and mobile production units."

According to Design Engineer Paul Peebles, flexible production systems and the mobility concept for surgical dressing production were the results of "extensive engineering and industrial time studies and testing." J & J faced some unique problems, Mr. Peebles notes, and radically new production ideas were essential to the solution of the problems.

To keep inventories at a minimum, Johnson & Johnson's production of surgical dressings is linked closely to continuous market analyses. The market analyses determine the monthly sales forecast for each type of dressing, and production schedules are revised according to these studies.

And with each change of production, the machine layout has to be revised. The wide variety of dressings are produced on the same basic machinery—but with variations in certain set-ups and in the production line layout.

Under systems in effect until just recently, a revision in the production line required the services of seven men—two electricians, a pipefitter, and four utility men—six hours to move a machine. To avoid extensive downtime, the revisions were scheduled for Saturdays. That meant seven men at overtime—a sizeable labor cost.

As surgical dressing production was expanded, Johnson & Johnson decided that the revising of production lines to meet the sales forecasts had to be put on a more efficient basis.

Flexibility and machine mobility were considered as primary factors from the very outset in planning production lines. Changes are needed almost from the beginning because the jump from the drawing board to

the actual plant floor is a big one, and many flaws become evident as the draftsman's concepts are turned into reality. Production flexibility is gained when machines can be moved about rapidly and easily—with little interruption to production.

In many firms, where production lines have to be shifted occasionally, a complete file of alternate plant layouts is maintained—a layout to fit each possible situation. Johnson & Johnson's engineers, after thoroughly studying the problem, came up with a plan to put surgical dressings on a flexible production basis.

Three Ways To Save

First, all power, water, and air connections for the machine units were fitted with flexible hose connections. Quick disconnect couplings on the machines and the hoses made hookup possible in a matter of minutes, without the services of highly trained, highly paid electricians and pipefitters.

Second, every machine unit in the J & J surgical department was equipped with leveling Barry Mounts that eliminate the need for lagging. These mounts serve a variety of purposes at Johnson & Johnson, the most important of which is to "provide machine mobility."

When fitted with these leveling mounts, machines are free standing and can be quickly picked up, moved to a new location, and put down ready for work. By the same token, no floors have to be broken, no bolts removed or any glues dissolved to lift the machines. Time is saved by self-leveling screws built into the mounts.

Since the floors at the present Johnson & Johnson plant are not strong enough to support fork lift trucks in transporting machines from one spot to another, special dollies with casters were designed to do the job. The matter of moving a machine now consists of jacking the unit up, sliding the dolly underneath, and rolling the machine to its new post.

Studies of the moving operation on the production floor using the flexible hose connections and the mounts show that where seven men in six hours were required to move a machine—now three utility men do the job in one hour.

A second dividend paid by machinery mounts and flexible hose connections is that of permitting centralized maintenance work. If a machine is mobile, the average line maintenance job becomes a repair job—in a central repair depot. This has several benefits. When a machine is in need of repair, it is lifted from the line, replaced by a unit in good working condition, and is quickly moved to the repair center. Thus, production is not halted by line maintenance of a faulty machine.

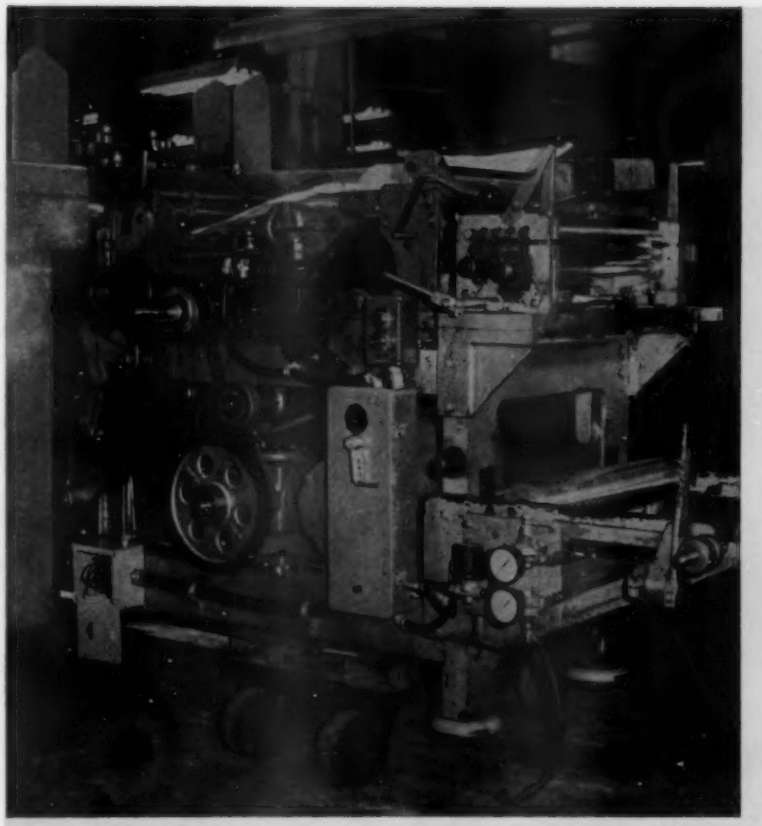


Fig. 2. This is the way the machine looks when it is being moved. Seven men formerly took six hours to move a machine. Three men do it in one hour, now

Away from the production floor, there is no concern for cluttering the area—and the right maintenance tools to do the job are available.

A study of maintenance operations at the Johnson & Johnson plant, prior to the shift to flexibility, showed that moving a machine from the production line to a repair center—a distance of approximately 600 ft — required seven men for an entire working day. The same machine after the modernization, now on mobile mounts and using the dollies, could be moved the same distance in just under two hours, employing only three men.

A third important function of the adjustable mounts is isolation of destructive vibrations and shocks resulting from machinery operations.

Machinery vibrations upset tolerances on precision equipment, cause machine "walking," cause stresses in machines which shorten machine life, and they cause damage to the plant structure — in addition to creating noise disturbance to personnel in nearby office and laboratory areas.

At Johnson & Johnson, the machine vibrations, carried through the plant's wood floors, were causing extensive damage to the structure. On occasion floor beams cracked from the heavy equipment and transmitted shock and vibration to the building. Barry Mounts effectively arrested this vibration problem, stopping the damage being done to the plant. At the same time, the bugaboo of machine operations—walking—was completely eliminated.

Utilizing the concepts of flexibility and mobility, J & J is able to face the competitive surgical dressing market and its quickly changing marketing patterns—with complete confidence in its flexible production system being able to handle the demands placed upon it. No longer does a sudden change in a market forecast mean heavy changeover costs and time delays.

All plant changeovers at Johnson & Johnson using the flexible hose connections and the leveling mounts are now routine affairs, only one quick step, in a streamlined and efficient industrial operation.

Fig. 1. The items with the wooden handles are carbon molds for holding fuel-alloy charges

Cathodic Protection Needed?

Test Conductors Were Connected to Piping for Answer

By ERNEST M. STOLBERG, Mechanical Supt., Housing Authority of Baltimore City, Maryland

ONE OF THE FIRST, large centralized boiler plants in the public-housing field was put into operation in East Baltimore, Maryland, in December, 1954, to provide steam service for 2804 families. To distribute the steam some 4200 ft of insulated, corrugated steel encased sections of piping were laid in sizes from 3 to 10 in. This piping runs between the steam source at the central heating plant and five housing projects.

Piping operations were of particular significance since they involved tunneling and trenching through an area in one of the oldest parts of the City of Baltimore. It was full of existing utility and service piping of large size and, in many cases, of uncertain location from obscure records dating back over 100 years. In addition, the pipe run required crossing five major city arteries, two of which are part of U. S. Route 40. One street is a major truck route, serving the industrial southern and eastern sections of the city.

Steam distribution pressure was set at 240 psi in order to keep down pipe sizes for reasons of economy. Much of the trenching was done in locations close to sea level.

Corrosion of any nature from either internal or external causes, could result in some very serious consequences to life and property—as well as greatly inconvenience people in a great many private homes and business concerns. Consider, if you will, consequences of pipe failure in our steam distribution system under U. S. Route 40 caused by external corrosion of the casing which would allow ground water to have a destructive effect on the steam main: 1. Lifting and melting of asphalt paving by 240 psi, 403 F steam. 2. Injury to passersby at time of failure. 3. Serious interruption to our services, other utility services. 4. Traffic tie-up and costly delays to both commercial concerns and individuals. 5. Expensive repairs because of around-the-clock emergency work. 6. Difficult public relations problems.

In order to avoid such disturbing possibilities, it is easy to understand why we intend to overlook no technical approach or method that will help to insure continuity of service and long, trouble-free life to our underground steam distribution system. Our approach, as of this writing, has been based on both internal and external protection for our 4200 ft of underground steam main.

After rather exhaustive chemical tests on both our steam lines and our condensate return piping, it was determined that the most effective method of combatting internal corrosion of the steam piping was to put a protective film over the metal. The idea was to make the inside impervious to the attack of the corrosion agents present in the steam and condensate, particularly carbon dioxide gas and oxygen. We have been using an amine treatment regularly for about a year and a half now with excellent results.

Protection for the external steel

casing is a matter which is considerably more involved and troublesome to determine and to analyze. Because the costs of protection, generally known as cathodic protection, are relatively high, it is always necessary to make a complete survey of existing, on-the-spot conditions. This helps determine the economic feasibility of installing a protective system or bearing the costs—both real and intangible—of corrosion failure.

The Housing Authority of Baltimore City has already surveyed its underground steam distribution system. Some 71 test conductors were installed in 13 manholes and other locations so that the survey crew representing the corrosion engineering consultants on this project, could take readings of electrolytic current flow at the test locations.

Our method of installing these test conductors is both interesting and instructive and can be followed by anyone having the services of experienced electrical technicians. It involves a technique known as Cadwelding, which is a variation of the old thermite process, of bonding street car rails together.

In Fig. 1, the necessary tools are shown. These consist of carbon molds with wooden handles, with the molds formed of varying radii on the bottom surface in order to mate exactly with various sizes of pipe. A cup-shaped chamber on top accommodates the powder charge. This charge is sold in varying strength to supply the degree of heat necessary to bond different cable sizes to parent surface.

Fig. 2. Steam main surface has been exposed for bonding of a test conductor

The powder charge contains both fuel and bonding alloy. A tube passage conducts the alloy to the pipe after firing. Before pouring the powder charge into the top chamber, a low melting point alloy disc is placed at the top of the communicating tube and serves as a retainer for the charge before firing. The charge is fired by an ordinary pistol grip sparking device commonly used with acetylene burning equipment. When the firing chamber cover is closed, an open slot remains for the pistol nozzle to be inserted and fired.

Figure 2 shows an exposed surface of the steam main to which the cable was bonded. This steel surface had to be prepared before bonding by wire-brushing down to clean metal, other-

Fig. 3. Plat of steam distribution system serving five housing projects of the Housing Authority of Baltimore City

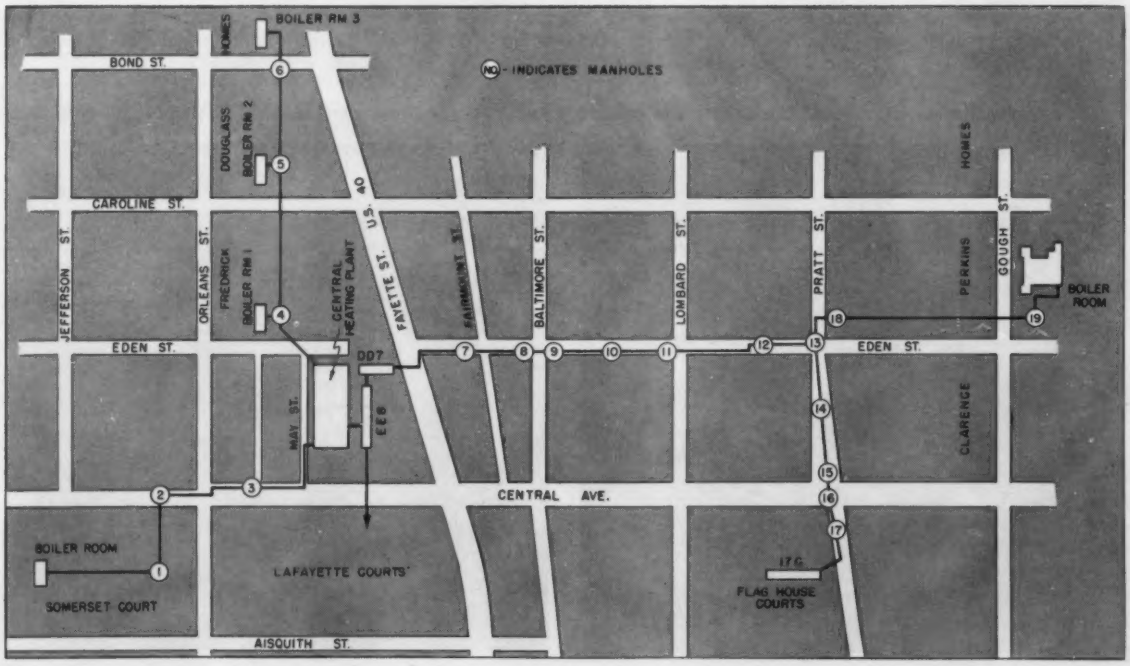


Fig. 4. Pistol grip sparking device ready to ignite the charge

Fig. 5. Result of the process; conductor attached to the pipe

wise the cable would not adhere to the pipe.

In Fig. 4 the bared end of the electrical conductor (No. 8 wire in this particular case) is ready to be joined with the cleaned surface of the steam main in one of the manhole stations. The carbon mold is pressed firmly against the pipe surface to prevent running of the liquid metal during the Cadwelding operation which would result in an unsatisfactory bond.

The completed Cadweld is tested by pulling vigorously on the electrical conductor. A satisfactory weld has the same tensile strength as the copper conductor, will not come off readily.

Figure 6 shows how test conductors are led through the manhole by routing through protective electrical conduit to a point just below the manhole cover.

Each conductor in Fig. 7 is tagged with an identifying copper disc. The tags are located near the terminating point below the manhole cover. This set-up permits the survey crew to take readings of electrolytic current flow at each bared conductor end for a picture of the electrolytic current which produces surface corrosion.

As is generally known, if the pipe surface or metallic casing is strongly cathodic to its surrounding and enveloping material, an electrolytic current will flow. Its rate and intensity will be proportional to the voltage difference between the pipe casing and the adjoining material. The stronger this current flow, the faster metal is removed from the piping or outer casing and the sooner local failure will occur on account of electrolytic corrosion.

In our operation, the survey was complicated additionally by the fact that the local public transit company operates an electric bus service on Gough Street. It uses an old bonded street car track system on Gough Street, which has been surfaced over with asphalt, as part of the circuit.

After several weeks of tests and observations by the contractors, L. Y. Smith Company of Cleveland, Ohio, it was concluded that there were no dangerous electrolytic currents affecting the underground steam-distribution piping. However, there were some stray currents detected above ground in the boiler plant of one of the projects (Clarence Perkins Homes). See Fig. 3. These stray currents will be isolated by the introduction of high dielectric strength insulating material where the piping enters the plant.

Fig. 6. Test conductors are routed through protective conduit

Fig. 7. Copper discs were attached to leads to identify them

Corrosion—What You Can Do About It

Authors Describe Mechanism and Prevention of Corrosion

If you do not keep a step ahead of rust, it can cause a lot of damage to industrial equipment . . . Here are several suggestions of what you can do to prevent this from happening . . . Also an example of how corrosion—an electrochemical phenomenon—attacks boiler equipment

By D. KUT, Powell Duffryn Technical Services, Ltd., and S. KUT, Pearl Varnish Co., Ltd.

EVERY YEAR a substantial portion of the national income is spent repairing damage caused by corrosion. Most metals—except a few "noble" metals, such as gold and platinum—corrode. They suffer from chemical attack when exposed to the action of moisture, oxygen, salts, acids or alkalis present in the atmosphere, and as a result the metal is gradually eaten away.

Corrosion Promoters

The rate of corrosion is greatest in, or near, industrial centers due to atmospheric pollution. In the absence of water, corrosion cannot occur. It is to be noted that generally the water involved in corrosion is not chemically pure, for even rain or water vapor in the atmosphere is contaminated with dissolved acids from industrial fumes. A particularly potent corrosion promoter is sea water and sea air, due to its high content of sodium chloride.

Mechanism of corrosion—Corrosion is considered to be an electrochemical phenomenon. A voltaic cell is set up if two electrodes are immersed in an electrolyte. Consider the corrosion of iron by sea water; i.e., the sea water being essentially a solution of sodium chloride. A corrosion cell is set up, the anode being the metallic iron, while the cathode is the iron oxide scale always present on the metal surface.

The sodium cations will move towards the cathode, where they will form sodium hydroxide and oxygen. The chlorine ions, however, dissolve the iron — the anode — forming iron chloride, which then reacts with the sodium hydroxide and oxygen to form rust.

The theory of corrosion is rather complex, but a general understanding of the mechanism of corrosion may be obtained by considering that an innumerable number of voltaic cells is established on a microscopic scale whenever a metal corrodes, the corroding metal always passing into solution at the anode and, for example, in the case if iron, forming rust.

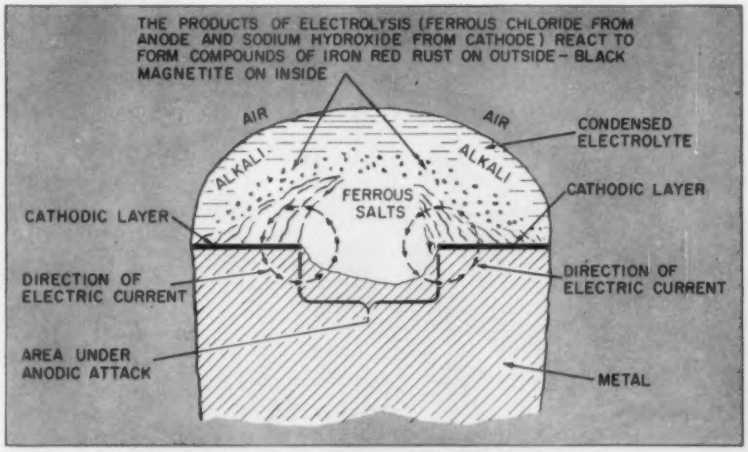

THE PRODUCTS OF ELECTROLYSIS (FERROUS CHLORIDE FROM ANODE AND SODIUM HYDROXIDE FROM CATHODE) REACT TO FORM COMPOUNDS OF IRON RED RUST ON OUTSIDE - BLACK MAGNETITE ON INSIDE
AIR
AIR
CONDENSED ELECTROLYTE
ALKALI
ALKALI
CATHODIC LAYER
FERROUS SALTS
CATHODIC LAYER
DIRECTION OF ELECTRIC CURRENT
DIRECTION OF ELECTRIC CURRENT
AREA UNDER ANODIC ATTACK
METAL

Fig. 1. Sketch shows the development of a "soft scab pit" from a droplet of moisture on a metal surface. An anodic attack will begin underneath the droplet

Corrosion of iron generally commences at a number of isolated centers and especially at points where the surface is defective. With the passage of time the areas under attack spread, new centers are formed, and eventually the whole surface of the metal becomes covered with rust. Metals in common use which suffer from corrosion are iron, copper, zinc, lead, aluminum and magnesium. The severity of the corrosive attack depends essentially upon the following factors: (a) atmospheric conditions; (b) possible contact with other metals; (c) impurities and surface imperfections of the particular metal.

Prevention of corrosion—The main methods employed for the prevention or at least reduction in the rate of the corrosion of metals, and, in particular iron, may be summarized as follows:

1. Painting. This method of protecting metals from corrosion is used widely.

2. Protective metal coatings. Protection may be obtained by coating the metal with a film of a non-porous noble, or semi-noble, or self protecting metal. Examples of the "coating" metals in common use are nickel, cadmium, copper, lead, tin and zinc. Application may be effected by electroplating, dipping, spraying or galvanizing. Tinning is another protective method frequently used.

In the event of corrosion occurring after the metal has been galvanized,

the zinc coating forms the anode and the iron the cathode in the corrosion cell. The zinc coating therefore corrodes away and not the iron. The zinc "sacrificially" protects the iron.

3. Inhibitors. Corrosion may frequently be suppressed by the addition of a reagent to the corroding system. Examples of such reagents are sodium nitrate and, particularly, sodium benzoate, the corrosion inhibiting properties of which have only recently been detected. Certain organic bases, such as morpholine and monomethylaniline, are also useful inhibitors.

4. Structural design and materials. The design of any structure should be such so as to avoid crevices or pockets (in addition to those unavoidably present, on the microscopic scale, on all metal surfaces) where moisture may lodge. It is also necessary to avoid contact between dissimilar metals which can set up corrosion cells. It is for this reason that copper and galvanized steel should not be connected together in a hot water service installation, since a copper/zinc corrosion cell may easily be formed by traces of copper depositing on the galvanized surfaces, and thus accelerate corrosion.

5. Elimination of moisture. Adequate ventilation, or the use of an effective anticondensation paint to prevent condensation of moisture will remove one necessary component in the corrosion cell—namely the electrolyte—the water solution.

As a practical example of corrosion consider the form of corrosion known as "soft scab" pitting, met in the superheaters of steam boilers, steel headers and any steam piping liable to contact with water which has been primed from the boiler.

Priming is caused by an excessive concentration of salts in the boiler, and these salts are carried over into the superheater and pipework where they are deposited. When the boiler is off the line the droplets of moisture formed on the metal surfaces due to condensation, dissolve the deposited salts and produce small droplets of concentrated electrolyte. A diagrammatic representation of the development of a "soft scab pit" from such a droplet of electrolyte is shown in Fig. 1, and the process is described as follows:

1. The droplet of electrolyte deposits on a metal surface and an anodic (corrosive) attack will commence underneath the droplet.

2. The oxygen in solution in the droplet is rapidly consumed in oxidizing the products of electrolysis and, since oxygen will continue to be absorbed at the surface of the droplet, a graduation in oxygen content from the outside to the center of the drop develops.

3. Attack now proceeds at the oxygen-starved zone in the center of the drop. The area adjacent to the junction between the droplet and the metal constitutes the cathode of the corrosion cell and is termed the "cathodic" layer.

4. The products of electrolysis diffuse and at an intermediate point react to form compounds of iron which are deposited as a ring around the anodic area and eventually form a porous cap. The products of the electrolysis are: ferrous chloride from the anode and sodium hydroxide from the cathode. In view of the graduation in oxygen content the oxides of iron will be in a reduced state—black Fe_3O_4—on the inside of the droplet, and in a fully oxidized state—Fe_2O_3—at the surface.

5. When the boiler is returned to the line, all the moisture will be evaporated from the product of corrosion and, due to oxidization on the outside by the flow of steam, red rust will be formed.

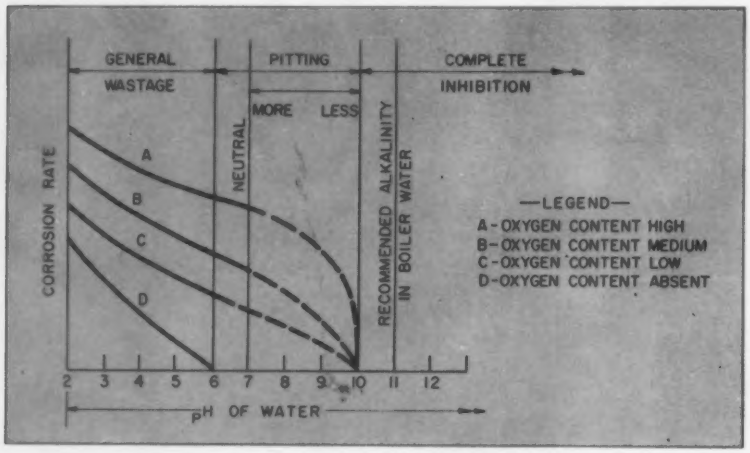


Fig. 2. Graph shows the influence exerted by the oxygen content and the pH value on rate of corrosion of steel at atmospheric pressure and temperature

The Term pH—Water is a compound of oxygen and hydrogen, each molecule of water consisting of one atom of oxygen and two atoms of hydrogen. A very small, though definite, proportion of the water is split up into hydrogen ions, each carrying a unit positive charge of electricity, and hydroxyl ions, each carrying a unit negative charge.

Ion Concentration

In chemically pure water, the product of the hydrogen and hydroxyl ion concentration is constant at any particular temperature; e.g., at 25 C (77 F) (taken as reference temperature) the constant is 10^{-14}. Since on ionization, one molecule of water gives rise to one hydrogen ion and one hydroxyl ion, the concentration of hydrogen ions must equal that of the hydroxyl ions, each being 10^{-7} at 25 C.

If now an acid is added to the water, the concentration of hydrogen ions is increased and, since the product of the hydrogen and hydroxyl concentration must remain constant, the latter is reduced.

The addition of an alkali to the water increases the hydroxyl ion concentration and so reduces the hydrogen ion concentration since their product must remain constant.

Oxygen Accelerates Attack

It follows from the above that the hydrogen ion concentration in a liquid indicates acidity or alkalinity. However, to avoid the use of rather cumbersome expressions, a hydrogen ion concentration (indicating a neutral solution) is expressed as pH7. Similarly, a hydrogen ion concentration (indicating an acid solution) is expressed by pH6, and a hydrogen ion concentration (indicating an alkaline solution) is expressed by pH8. In this method of notation, a decrease of one unit in pH indicates a tenfold increase in the hydrogen ion concentration.

Corrosive attack is accelerated by the presence of oxygen in the electrolyte. Experience has shown that corrosive attack in the presence of oxygen depends both on the amount of oxygen present and on the temperature, as well as on the pH value. Very small amounts of oxygen can cause pitting in high pressure steam boilers which operate at high temperatures. The graph, Fig. 2, shows the influence exerted by the oxygen content and pH value on the rate of corrosion of steel at atmospheric pressure and temperature.

Fig. 1. A 20-ton hydraulic ram is being used here to remove a tapered roller bearing, using a double-grip short arm puller and bearing pulling attachment. Step plate adapter is used to provide a base for the adjusting ram's screw

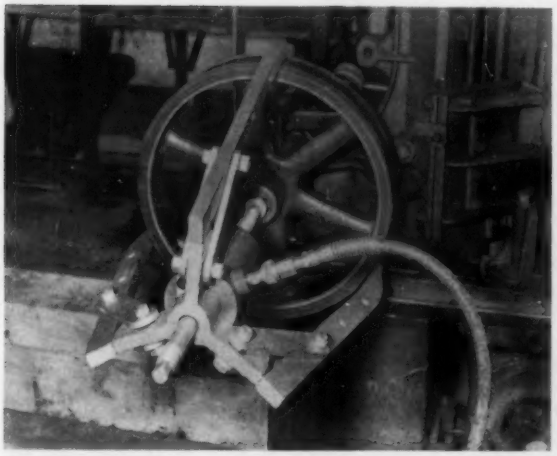
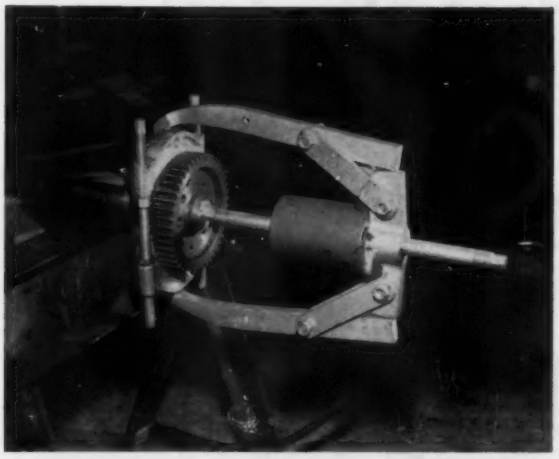
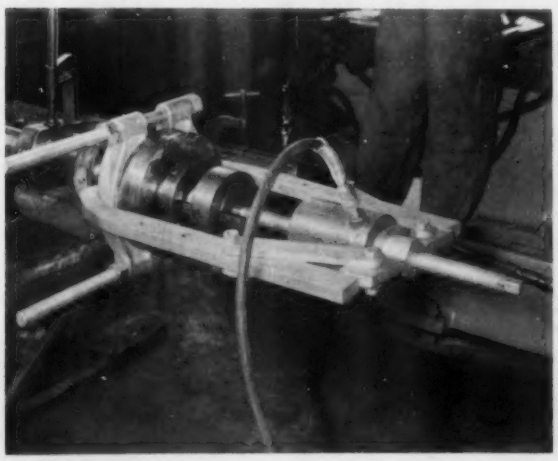


Fig. 2. To remove this power hack saw pulley, a 20-ton hydraulic ram is employed with a triple puller attachment



Figs. 3 and 4. Above: drive gear is removed with 20-ton hydraulic unit; below: 30-ton unit removes a brake collar



Hydraulic Puller For Your Gear, Shaft And Bearing Repairs

COMPLICATED MAINTENANCE pulling operations which often required long periods of repair time can now be done hydraulically with a minimum of labor and at a fraction of the time formerly needed. This is all possible with the hydraulic puller, Holl-O-Ram.

This unit differs basically from standard rams and industrial hydraulic jacks by having a hollow ram plunger into which smooth, threaded or serrated plunger saddles can be threaded. Through the use of an adjusting screw and various attachments which are available, the puller can fit numerous industrial shaft-driven maintenance applications.

Since it exerts a torque-free, smooth hydraulic power, tons of pressure are placed under the finger-tip control of the operator. In addition, because the ram is separated from the motor-driven unit or hand-operated pump by a flexible hose, the operator has such benefits as "sight-of-job" and an additional margin of safety.

The unit comes in 20, 30 and 60 ton capacities with a complete set of seven pulling attachments for various shaft pulling jobs.

Additional Information

If you would like more information about this hydraulic puller, either write the Editor, PLANT ENGINEERING, 110 South Dearborn St., Chicago 3, Illinois, or indicate "Holl-O-Ram" on the post card in this issue.

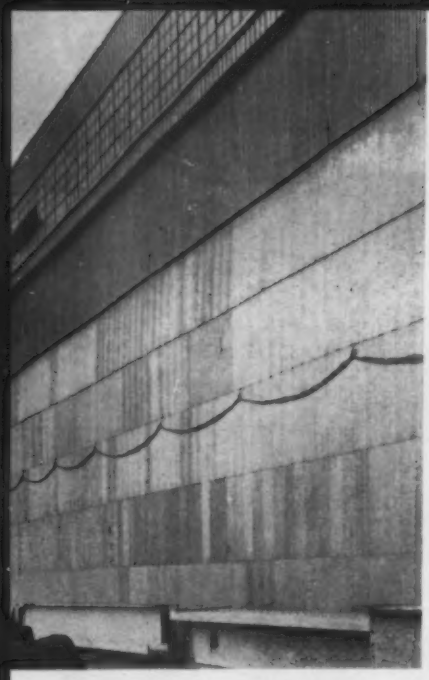


Fig. 1. Outside view of temporary wall

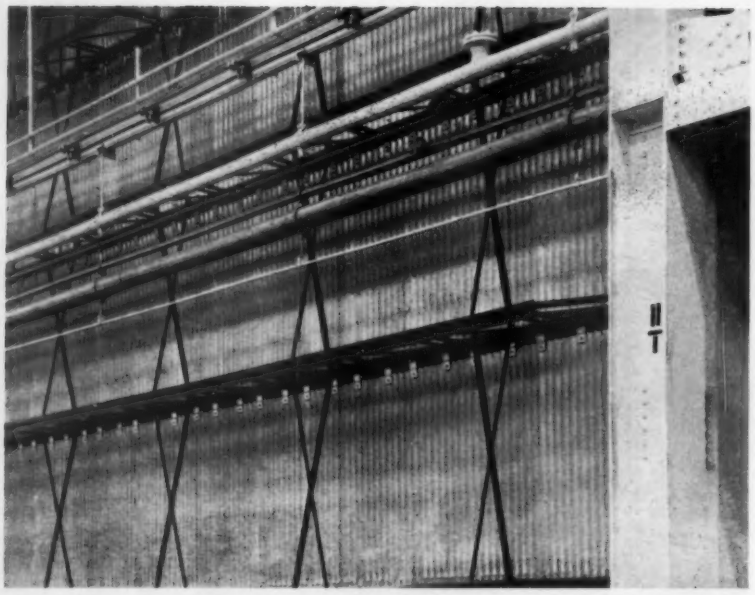


Fig. 2. Temporary corrugated galvanized steel wall encloses five bays of shop

Temporary Wall + Heat = Production

GM Puts Partially-Finished Shop into Production

By S. A. RICHARDS, Assist. Plant Engineer, Electro-Motive Div., General Motors Corp., La Grange, Ill.

TWO PROBLEMS recently faced Electro-Motive Division of General Motors Corp. at La Grange, Illinois, when they started last summer to build a 690,000-sq ft addition to house the fabrication of diesel locomotive underframes and hoods. The first problem was that construction could not be completed before cold weather set in; the other was the problem of heating and ventilating in such a manner that the shops would not be under slight vacuum, which is caused by ventilation of shot blasting, painting and other facilities discharging a large volume of air from the building.

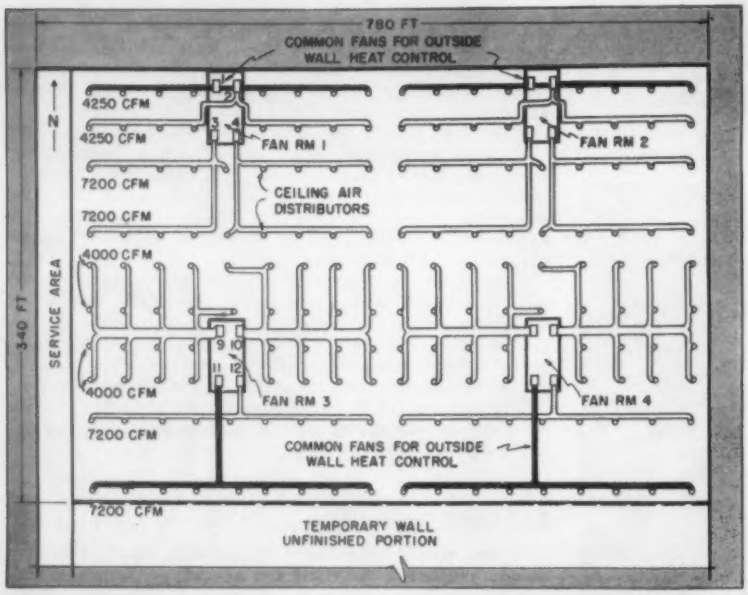


Fig. 3. Diagram shows location of the four fan houses and flow of heated air

Although the steam plant was to be enlarged it was quite evident that it would not be ready for the 1956-1957 heating season, nor would the present boiler capacity be adequate to heat the entire new building. Our present boiler would heat an additional 270,000 sq ft of building, and this area was about the size of five bays of the total 14 bays to be constructed.

One solution to the problem was the erection of a temporary wall enclosing the bays already completed. This would enable us to heat them and it was determined that the advantages of the production area gained in this way would outweigh the cost of the wall. The wall would have to be 25 ft high, 780 ft long, and would be mounted on the building columns which were on 40 ft centers.

Several ideas were considered, but the one adopted was to use bar joists in a horizontal position clamped to the building column flanges. They were spaced at 5-ft intervals and held rigid by vertical cross braces. Corrugated, galvanized steel sheets were clamped to the bar joists to form a solid wall. No attempt to insulate the sheets was made. See Figs. 1 and 2.

(Continued on page 256)

H. T. McBride, left, accepts president's gavel for the Pittsburgh Chapter of the AIPE from retiring president, R. P. Crane. R. W. Hiller, past president of AIPE, looks on

Activities of Plant Engineers' Societies

AS THE NUMBER of Plant Engineers' Societies increases so will their activities. Following is a brief report of what some of these Societies are doing:

Niagara Frontier

The March meeting of the Niagara Frontier Society of Plant Engineers was held at the Park Hotel, in Niagara Falls, Ontario. After the business meeting, the group toured the facilities of the Sir Adam Beck Power Station in Canada. They were shown all the interesting engineering aspects of the power station.

Also included in this program was a film on the "Construction Phase of the Power Station," followed by a talk on the pump generating station.

New York

At a recent meeting of the New York Plant Engineers' Chapter of the AIPE, members heard an interesting talk by P. Schuyler Van Bloem, Executive Vice President, Brown & Matthews, Inc. The subject of Mr. Van Bloem's talk was: "The Design and Construction of the Modern Industrial Building."

Forty-one members and guests attended this interesting and informative meeting. After presenting a review of the modern techniques and problems peculiar to constructing a modern industrial plant, Mr. Van Bloem answered many questions involving modern construction.

Merrimack Valley

Maintenance cleaning is a subject of major concern to plant engineering departments. Because of this the Merrimack Valley Chapter of the AIPE scheduled a talk by Mr. R. P. Jones of Oakite Products, Inc., on the subject: "Some Good Things to Know About Plant Maintenance Cleaning."

Chicago

Members and guests attending the March meeting of the Chicago Chapter of the AIPE heard a talk by R. Schadt of Westinghouse Electric Co. The subject of his talk was: "What Does the National Electric Manufacture Association Rating on Motors and Starters Mean to the Plant Engineer."

In addition to the talk, Mr. Schadt showed an excellent film on lubrication along with a number of slides dealing with motors and starters.

Northern Illinois

"Corrosion Control in Steam and Hot Water Generating and Distribution Systems," was the subject of a talk recently presented to members of the Plant Engineers' Society of Northern Illinois.

Speakers for this meeting were: Fred Feuille, District Engineer and David R. Miller, Sanitary Engineer, both from Betz Laboratories, Inc.

Los Angeles

Los Angeles Chapter No. 17 of the American Institute of Plant Engineers elected officers for the coming year.

C. A. Gallaher, of Aeronautical Div., Robertshaw-Fulton Controls Co., was elected president. Other 1957 officers chosen, include: W. H. Slater, of Emsco Manufacturing Co., as vice president; M. S. Bolzer, of Harvey Machine Co., as secretary; and G. A. Evans, of American Brass Co., as treasurer.

Pittsburgh

New officers for the Pittsburgh Chapter of the American Institute of Plant Engineers will be:

H. T. McBride, of Pittsburgh Coke and Chemical Co., president; T. L. Bieber, of Union Switch and Signal Division, Westinghouse Air Brake Co., vice president; J. W. Mayers of Pittsburgh Coke and Chemical Co., secretary-treasurer.

Prior to his present assignment as superintendent of maintenance for the Chemical Division of Pittsburgh Coke and Chemical Co., McBride was affiliated with American Cyanamid Co., Hartford Steam Boiler Inspection and Insurance Co. and General Electric Co. He is a charter member and served on the first executive board of the Pittsburgh Chapter.

Twin Cities

Subject of the panel discussion at the March meeting of the Twin Cities Plant Engineers' Society was: "Planning and Scheduling Maintenance."

The three club members who participated in this panel discussion were: R. C. Thompson, of Whirlpool-Seeger Corp., T. Chapin of the Theo. Hamm Brewing Co. and B. C. DeCorsey of Montgomery Ward & Co. With the diverse nature of the three companies the discussion covered a number of phases of maintenance.

Initial meeting of the Penn-Ohio Plant Engineers' Society was held at Hotel Pick-Ohio, Youngstown, Ohio, on March 14. George E. Chapman of Westinghouse, third from left, standing, was appointed temporary chairman of the group

Penn-Ohio P. E. Society Organized

Plant Engineers from Four Cities Take Part in Its Formation

TWELVE PLANT ENGINEERS from industrial plants in Youngstown, Sharon, Niles and Girard attended an informal dinner meeting on March 14 to discuss the organization of a plant engineers' society in the area.

Those men attending, and identified in the picture above are:

Seated, left to right: E. W. Chaffee, St. Elizabeth Hospital, Youngstown, Ohio; F. G. Koval, National Malleable & Steel Castings Co., Sharon, Pa.; W. T. Brennan, Westinghouse Electric Corp., Sharon, Pa.; E. R. Halker, General Electric Co., Niles, Ohio; C. A. Amedia, Youngstown Metropolitan Housing Authority, Youngstown, Ohio; and W. Siefert, Westinghouse Electric Corp., Sharon, Pa.

Standing, left to right: R. W. Hiller, Dravo Corp., (Pittsburgh Chapter) AIPE past president, representing the national organization; K. K. Stenger, Hathaway Bakeries, Inc., Youngstown, Ohio; G. E. Chapman, Westinghouse Electric Corp., Sharon, Pa.; F. H. Barackman, Ohio Leather Co., Girard, Ohio; W. K. Carnahan, Mallory Sharon Titanium Corp., Niles, Ohio; M. M. Coon, Sharon Steel Corp., Sharon, Pa.; N. G. U'Halie, Sawhill Tubular Products, Inc., Sharon, Pa.; and R. L. Marinello, PLANT ENGINEERING magazine.

Kits containing information about other plant engineers' societies that have been organized were distributed to the men. These kits also contain sample constitutions of some of these societies and an outline for discussion.

Rocky Marinello, of PLANT ENGINEERING, and Bob Hiller, representing the AIPE, were on hand to answer any questions the group may have about organizing a plant engineers' society or the national organization—the American Institute of Plant Engineers.

Following this general discussion and based on the comments from the men, the group decided in favor of organizing such a society in their area. It will be known as the Penn-Ohio Plant Engineers' Society.

George Chapman, of Westinghouse Electric Corp., was appointed temporary chairman. He will carry on the official duties of the group until they have their election of officers.

Nick U'Halie, of Sawhill Tubular Products Inc., and Frank Koval, of National Malleable & Steel Castings Co., were appointed to the Constitution Committee. They will work with George Chapman in preparing a rough draft of a constitution for discussion and adoption at the next meeting.

To help in the preparation of this draft, the Constitution Committee will review the constitutions and by-laws of the Cleveland and Pittsburgh Chapters as well as the AIPE constitution to be sure that theirs will conform with the policies and practices of other Chapters and the AIPE.

Future meetings of the group will be on first Thursday of the month.

Even in moist and corrosive atmospheres...

Rome's multi-purpose cable meets your toughest branch circuit needs

Developed initially for the safer wiring of farm buildings—a really tough assignment—Rome FlexAll can be safely installed in practically all of your tough-duty locations. Approved for direct-in-earth burial, FlexAll is perfect for outdoor lighting applications—residential, rural, industrial, and commercial. And it's ideal for locations where moist and corrosive atmospheres prevail: for food processing plants, dairies, breweries, packing houses, cold storage and ice plants, etc.

PACKAGED FOR CONVENIENT USE. Rome's multi-purpose FlexAll is packed in 250-foot cartons for easy storage and use.

The tough Rome Synthinol (polyvinyl chloride) jacket protects the cable against air containing salt, smoke, or humidity. And it's resistant to corrosion, abrasion, and even flame. It assures safety, easy handling and long cable life. Select Rome FlexAll for your toughest branch circuit applications.

The National Electrical Code recognizes Rome FlexAll for all these uses:

Single Conductor, Type UF

- For branch or feeder circuits buried directly in earth, when provided with overcurrent protection.

Multiple Conductor, Type UF and NMC

- For branch or feeder circuits buried directly in earth, when provided with overcurrent protection.
- For interior wiring, either exposed or concealed, in dry, wet or corrosive locations.
- For installation within hollow spaces of outside or inside masonry block or tile walls.
- For embedding in plaster or shallow chase in masonry, when suitably protected.

Contact your nearest Rome Cable representative for further information —or write to Department 344 and ask for Bulletin UF-1. Rome Cable Corporation, Rome, New York.

ROME CABLE

CORPORATION

For more facts circle 569 on Reply Card

Program of Western Plant Maintenance And Engineering Conference

EMPHASIS WILL BE placed on maintenance problems of western plants and industrial facilities at the Third Western Plant Maintenance and Engineering Conference. The conference will be held concurrently with the Third Western Plant Maintenance and Engineering Show at San Francisco's Civic Auditorium, June 11, 12 and 13.

Program for the two-day conference will be:

Tuesday, June 11
General Meeting—9:30 a.m.

Planning and Scheduling Maintenance Work—Planning and scheduling for efficiency, for construction work, and for vacation shutdown. Also use of statistics and records; record-keeping methods; how to hold paper work to a minimum; and coordination of planning and scheduling for cost control and for production.

Chairman: J. E. Thompson, Stanford Research Institute, Southern California Laboratories, South Pasadena, Calif. Speakers: G. S. Fairhurst, Asst. Chief Engr., California & Hawaiian Sugar Refining Corp., Crockett, Calif.; and L. V. Herich, Plant Engr., Cannon Electric Co., Los Angeles, Calif.

Concurrent Meetings—1:00 p.m.

Preventive Maintenance—Results of preventive maintenance as measured by costs, continuity of operation, capital investment, and other yardsticks. How management cooperated in setting up the preventive maintenance program.

Chairman: J. J. Timmer, Editor, *Western Industry,* San Francisco, Calif. Speaker: E. F. Boobyer, Chief Utilities Engr., Kaiser Aluminum & Chemical Corp., Oakland, Calif.

Upkeep of Buildings—Frequency of roof inspection and what to look for in the way of failures. Inspection and preservation of walls, such as masonry, brick, stucco, wood and metal. Care of floors as to surfacing, cleaning, patching and preserving wood, concrete and mastic.

Chairman: J. M. Weeks, Plant Engr., Proto Tool Co., Los Angeles, Calif. Speaker: B. P. La Forge, Supt. of Bldg. and Equip., Consolidated Electrodynamics Corp., Pasadena, Calif.

Concurrent Meetings—2:45 p.m.

System of Maintenance Cost Control—Talk will describe an actual cost control application, and discuss estimating, budgeting, cost records and cost reports. Also, use of repair records to decide on equipment replacement and comparison of actual costs with budgeted costs.

Chairman: F. M. Reibin, Garretson & Elmendorf, San Francisco, Calif. Speaker: S. L. Blank, Senior Indus. Engr., Longren Aircraft Co., Torrance, Calif.

Maintenance Stores-Keeping—Discussion on positioning of storerooms in the plant. All about stocks and stock record-keeping and methods of withdrawal.

Chairman: H. N. Overtoom, Plant Manager, San Francisco Machine Shop, American Can Co., San Francisco, Calif. Speaker: L. Seager, Plant Engr., The Eimco Corp., Salt Lake City, Utah.

Wednesday, June 12
Concurrent Meetings—9:00 a.m.

Effective Organization of Maintenance Manpower—Description of an organization that is working successfully. Speaker will cover functions performed, responsibilities by titles and relation of maintenance personnel and jobs to those of production and top management.

Chairman: T. H. Hardgrove, Plant Engr., Aerojet-General Corp., Azusa, Calif. Speaker: H. J. McKeever, Mgr. Service Shops, General Electric Co., San Francisco, Calif.

Maintenance of Electrical Equipment—Upkeep of electrical distribution equipment; forms for testing and inspecting, frequencies of attention. Also, upkeep of rotating equipment and controls.

Chairman: H. M. Eversz, Plant Engr., McCulloch Motors Corp., Los Angeles, Calif. Speaker: O. H. Wells, Engrg. and Service Supvsr., Westinghouse Electric Corp., San Francisco.

Concurrent Meetings—10:45 a.m.

Area vs. Centralized Maintenance—Pros and cons. Requirements for working forces. Lines of authority and responsibility. Relation of preventive maintenance to both systems. How to keep track of costs.

Chairman: C. A. Gallaher, Plant Engr., Aeronautical Div., Robertshaw-Fulton Controls Co., Anaheim, Calif. Speakers: P. J. Gurklis, Genl. Supt. Maint. Shops, The Dow Chemical Co., Texas Div., Freeport, Texas; A. J. Wilson, Jr., Plant Eng., Ampex Corp., Redwood City, Calif.; and W. E. Fore, Plant Engr., North American Aviation, Inc., Los Angeles, Calif.

Maintenance Training That Works—Report of a successful training program. How the people were selected. Suggestions for training the machine tool mechanic.

Chairman: E. Goodbar, Supt. of Maint. and Utilities, Columbia Geneva Steel Div., U. S. Steel Corp., Pittsburg, Calif. Speaker: M. Muller, Maint. and Repair Supt., National Biscuit Co., Portland, Ore.

Concurrent Meetings—1:00 p.m.

How To Control New Projects—Methods used to request, design, estimate, carry on field work, and control cost for new work or alterations.

Chairman: M. P. Laursen, Chief Indus. Engr., Marchant Calculators, Inc., Oakland, Calif. Speaker: W. J. Smith, Section Head, Plant Engineering, Goodyear Aircraft Corp., Arizona Div., Litchfield Park, Ariz.

Waste Disposal Problems and Solutions—Method of treatment and disposal of types of industrial waste. Costs. Byproducts.

Chairman: W. J. O'Connell, W. J. O'Connell & Associates, Burlingame, Calif. Speaker: R. R. Scholar, Plant Engr., Stauffer Chemical Co., Richmond, Calif.

Concurrent Meetings—2:45 p.m.

Getting Maintenance People To Work as a Team—Seeing that the right people have the right jobs. Fixing responsibilities. Setting up standards. Giving cost and downtime facts

(Continued on page 256)

boiler water levels now easier to **see**... easier to **read**

Whatever the boiler pressure, high or low, YARWAY Remote Indicators give accurate, instant, eye level boiler water level readings at any convenient plant location.

Boiler Code Case No. 1155* says in part, "... two independent remote level indicators of the compensated manometric type may be used instead of one of two required gage glasses for boiler drum water level indication in the case of power boilers with all drum safety valves set at or above 900 psi..."

YARWAY Remote Liquid Level Indicators fill the bill—and feature a "wide vision" face that makes reading easier from any angle.

Accurate—because indicator is actuated by the boiler water itself—by the pressure differential between a constant head and the varying head of water in the boiler drum.

Also use YARWAY Remote Indicators on heaters of various types.

For full description, write for YARWAY Bulletin WG-1824.

*Write for free reprint of case description.

Yarway Remote Hi-Lo Alarm Signals—lights or horns—can be used with Yarway Remote Liquid Level Indicator and placed at any location in the plant.

YARNALL-WARING COMPANY

145 Mermaid Avenue, Philadelphia 18, Penna.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY REMOTE LIQUID LEVEL INDICATORS

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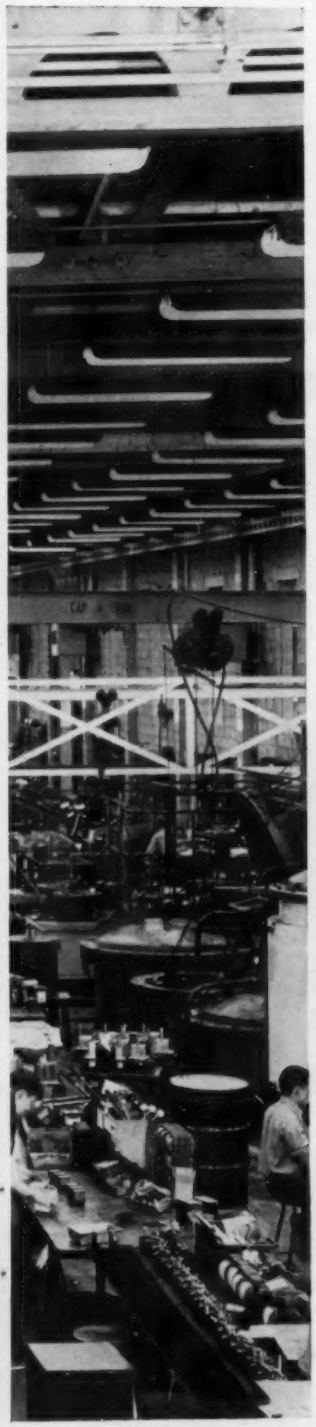


Here's how Westinghouse power centers increase plant output...safely

Safe, efficient power distribution that actually helps increase plant output... that's what this Western Pennsylvania manufacturer realized by installing modern Westinghouse dry-type power centers.

Dry-type power centers minimize installation costs because they are completely safe. Since they are *both* fire and explosion resistant, they can be located right in the production area. They require no vaults, catch basins, toxic gas vents, or drains. Lightweight, they can be installed overhead, releasing valuable floor space for production. This makes it easier to locate them close to the load they serve, shortening secondaries, cutting line losses, improving regulation. The result: Increased production efficiency.

In the plant pictured at the left, two Westinghouse power centers divide the load. Capacity is provided in each to allow for expansion.

Add these up for your plant: (1) Safe, economical installations. (2) Increased production space. (3) Increased plant efficiency through improved regulation. (4) Savings in power cost through reduced losses. (5) Savings in heavy copper through shortened secondaries.

Westinghouse power centers can bring these advantages to your plant, too. Because they are factory assembled and coordinated as one unit, with components designed to meet your individual requirements, they can be installed quickly and easily. For further information, check with your contractor, your Westinghouse distributor or local representative, or write direct to Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa.

J-70708

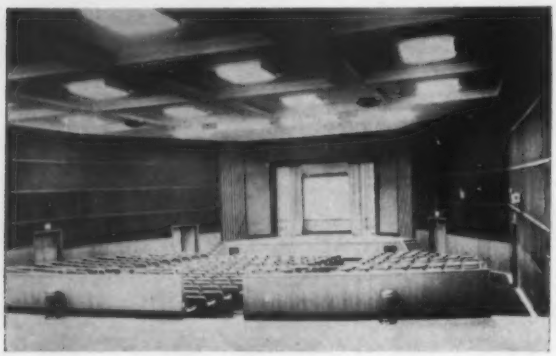
YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 571 on Reply Card

Unused Theater Transformed Into Education Building For Industrial Plant

COMPLETELY RENOVATED and modernized as the new Education Building of Standard Pressed Steel Co., the old Glenside Theatre in Abington Township, Penna., has reopened its doors.

In need of a large industrial meeting place, SPS purchased the theater and its equipment for $45,000. It has completely overhauled the structure and its facilities at an additional cost of $60,000.



The front two-thirds remain a theater, equipped with 420 modern seats. The back third of the theater has been leveled into a lobby or lounge area, large enough to accommodate formal dinners for 125 people, buffet meals for as many as 400. Additional seats can be installed here to enlarge theater viewing capacity to 650.

The hall is equipped for projection of slides or 16-mm motion pictures. There is a new wired-in audio system over which phonograph, tape or voice of speakers using microphones anywhere in the hall can be heard.

SPS found it more practical to buy and remodel than to build on its own property for the following reasons: It cost less—about ⅔ the cost to build a comparable auditorium; it was fast—two months from the decision to start renovating, SPS had a completed facility; no ground around the plant had to be used for the job; the new building lets SPS play host off the plant property, where large groups can't interfere with work routine; and the theater is more centrally located than the manufacturing plant.

Lab-Size Control Promises Advance in Electroluminescent Lighting

RECENT ADVANCES by the electronics and nuclear physics department of the Westinghouse Research Laboratories have furthered the applications of electroluminescence—the production of light from a glowing phosphor imbedded in a sandwich of glass and metal. About one-eighth of an inch thick, the panels use no bulbs or lamps of any kind to produce a cool, shadowless light which can be varied in brightness and in color at the turn of a dial.

Possibilities for its application include its use as a picture-producing device to replace the ordinary cathode ray tube, or television picture tube. This would make possible large flat screens of any desired size.

Primary requirement for success in adapting electroluminescence to a large flat screen is a method of controlling, at will, the brightness of the screen over its entire surface. A new electronic device incorporates such brightness control on a laboratory scale. Since the device can be made to rapidly build up light intensity until it saturates and "locks in" when triggered, it also offers promise as a memory element in automatic control.

Conversion of Highway Trailer to Rail Car Hinges on Rubber

FORTY-EIGHT POUNDS of rubber enable an Eastern railroad to convert a rail-rolling freight car into a highway-bound semi-trailer and back again in 60 seconds.

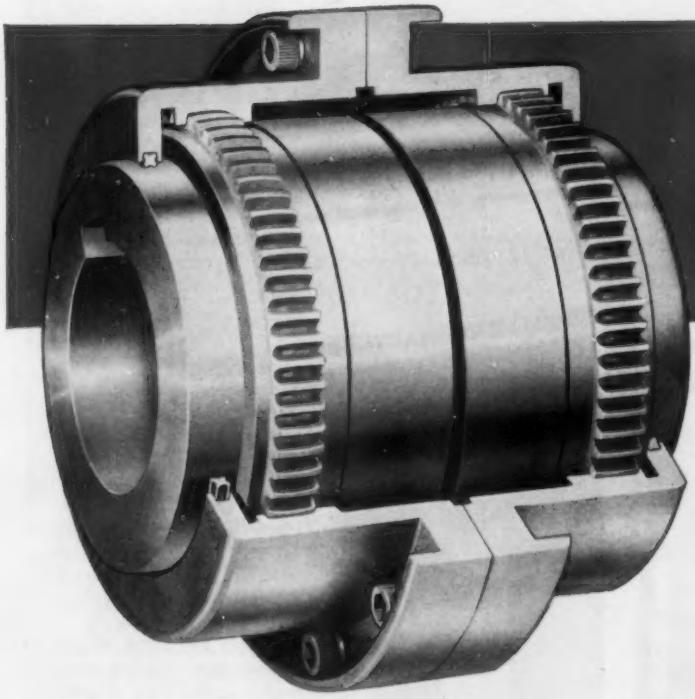
This conversion is performed on a development of the Chesapeake and Ohio Railway—a combination van equipped with both rail wheels and highway wheels. It is designed to function equally well on highways and rails.

Arms supporting both highway and rail wheels are attached to the outer casing of a Torsilastic spring, a development of B. F. Goodrich Industrial Products Co., Akron, Ohio, made up of a rubber tube bonded to an inner, stationary metal tube and a movable outer metal sleeve. Deflection of the rubber provides elasticity.

The stationary elements of the Torsilastic spring are linked through a splined sleeve and an arm to the actuator screw, which is driven through a gear train by an air motor. Functioning on 90-psi air brake pipe pressure, the motor twists the spring, transferring the Railvan wheels from highway to rail position or vice versa in about 30 seconds. A locking device in the motor fixes the suspension system in any position.

Why LINK-BELT geared flexible couplings can

transmit more hp per coupling dollar



Size for size, they accommodate larger shafts . . . transmit more power than other comparable couplings

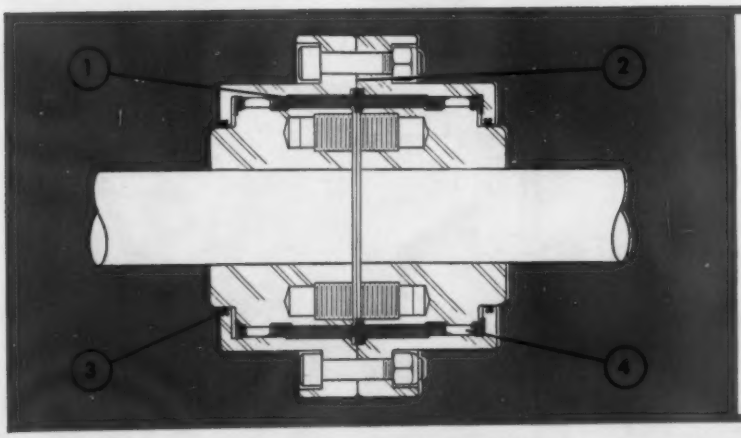
LINK-BELT geared flexible couplings offer an ideal combination of compactness, performance and low cost. They're designed for high load capacity, yet cost less because they are smaller.

Hardened steel socket head flange bolts —ground for close fit—are the key to compactness. They permit a smaller flange. Thus, more of the coupling diameter is devoted to the gear and a larger hub which can be bored to accommodate larger shafts.

In a great variety of coupling applications—including those where shock, vibration, reversing loads and misalignment are encountered—these couplings can be used effectively to assure long life and minimum maintenance. Popular sizes are available with finished bores, packaged and ready for installation. For complete details, contact your nearby Link-Belt office or authorized stock-carrying distributor. Or write for your copy of Folder 2775.

LINK-BELT

GEARED FLEXIBLE COUPLINGS



2-piece housing design assures efficient sealing and lubrication

1. In operation, the lubricant centrifuges to the working gear surfaces at the perimeter of inside cavity.
2. Fiber gasket fits tightly between flanges. Lubricant can't escape.
3. Hub seal is smaller in diameter than gear teeth and running level of lubricant. No leakage is possible—dirt and water stay out.
4. Mating gear teeth are constantly lubricated, preventing wear and providing long, trouble-free operation.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.484

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Power Company Uses "Balloon" Structures for Warehousing, Equipment, Construction

DUKE POWER CO., the largest utility company south of the Mason and Dixon Line, has ordered a second CID air structure for use as general storage warehouse of utility equipment and building materials in connection with its steam generating plant at Pelzer, South Carolina.

Each of these low-cost warehouses is the standard 40-ft by 80-ft air structure complete with blower and the standard 4-ft by 8-ft wood frame door, developed by and manufactured exclusively by CID Air Structure Co., Chicago. The fabric is Fiberthin, a white vinyl coated nylon made by U. S. Rubber Co. Since the structure is supported entirely by low pressure air, storage area is unobstructed.

The structure provides all-weather storage area, which can be taken down readily and erected elsewhere. The translucent material permits the entry of sufficient daylight for the usual storage activities within the structure. The blower maintains a constant stream of low-pressure air which supports the structure even when the swinging door is opened for the entry of fork lift trucks. Larger doors and airlocks are available.

The cost of the structure was $1.00 per sq ft of floor area, complete with door and blower, and erected.

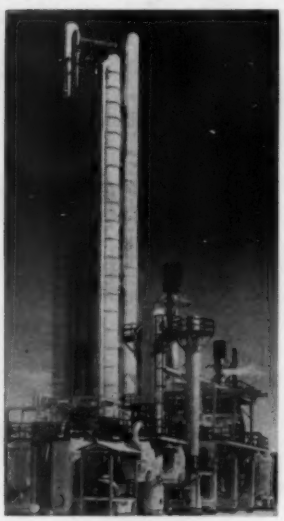
Aluminum Crane Flexes Its Muscles

AN ALL-ALUMINUM welded mill crane proved more than equal to the task of lifting a 203-ton mill housing at the new sheet, plate and foil rolling mill Kaiser Aluminum & Chemical Corp. is building at Ravenswood, W. Va.

Rated at only 125 tons, the Cleveland crane showed girder deflection of 3/16 in. less than AISE code, with the overload at the center of the 83-ft span. Pickup and move were accomplished at normal operating speeds.

This is one of 27 aluminum cranes installed in the mill for heavy duty materials handling.

Tall Towers in Texas



FOUR GIANT distillation towers, each nearly 200 ft tall, mark the first and only plant producing styrene by direct recovery of ethylbenzene from gasoline. The process is the first to produce the styrene without the synthesis of ethylbenzene—an exacting and costly operation.

Nearly twice the height of standard fractionators, each of the four towers was built and erected by the Badger Mfg. Co. for Cosden Petroleum Co., in Big Spring, Texas. Each tower, a 110-ton unit, was delivered and erected in one piece. The towers rest on a single foundation.

Gas Turbine-Generator Furnishes Heat, Power to Rubber Plant

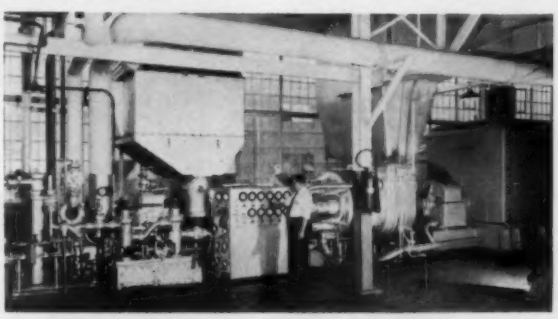
FIRST GAS TURBINE in the rubber industry has been placed in operation at Denver, Colorado, by the Gates Rubber Co.

The gas turbine-generator unit, rated at 500 kw, not only furnishes the plant with electricity but also supplies heat to make process steam in a heat recovery boiler.

Constructed by General Electric Co.'s Gas Turbine Department, the simple-cycle, single-shaft gas turbine is designed for dual-fuel operation, burning natural gas or distillate oil.

The gas turbine's 15-stage compressor pulls in 5,250,000 cu ft of air per hour, and after compressing it, forces it into the combustion chamber where the fuel is burned.

Expanding gases then pass through two stages of turbines which turn the compressor and the speed reduction gears which in turn are connected to the 3600-rpm generator. The turbine itself rotates at 6912 rpm.



The exhausting gases are piped through a boiler and produce 35,000 lb of steam per hour at 250 psig and 600 F for processing applications. The exhaust gases from the turbine are still rich with oxygen and by burning additional fuel, boiler produces 120,000 lb of steam per hour.

Cyclotherm Division, National U.S. Radiator Corp., Oswego, N. Y., increases drafting room output with Kodagraph Autopositive Film intermediates. These extremely translucent "masters" also produce sharper prints for this leading manufacturer of oil- and gas-fired steam and hot water generators.

"Like having 6 times the drafting room force"

AT CYCLOTHERM, jobs that once took days are now done in hours. For example—several draftsmen prepare segments of large drawings simultaneously. Then these units are taped on a form, which is reproduced on Kodagraph Autopositive Film. Result: A sparkling new drawing in no time at all.

Another big time-saver—Cyclotherm's complicated drawings must be changed constantly to meet customer requirements. No redrafting . . . drawings are reproduced on Autopositive Film. Unwanted detail is removed . . . new detail drawn in.

Cyclotherm also uses Autopositive Film to provide duplicate tracings for its record file . . . supply "reproducibles" to customers . . . reclaim old, dog-eared drawings.

Kodagraph Autopositive Film is the ideal material for all these applications. It is durable, highly translucent, and has good dimensional stability. Also, it permits exceptionally fast print-back speeds, produces truly sparkling results, is photo-lasting in the files. So convenient to use, too . . . requires no darkroom, is exposed on a standard contact printer. *And it prints directly to a positive, eliminating the negative step.*

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Graphic Reproduction Division, Rochester 4, N.Y.

Kodagraph Reproduction Materials

New booklet is jam-packed with valuable tips on saving drafting time, protecting drawings, getting better prints. Shows how you, or your local blueprinter, can process these low-cost materials with existing equipment. Mail coupon for your free copy.

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How You SAVE MONEY With...

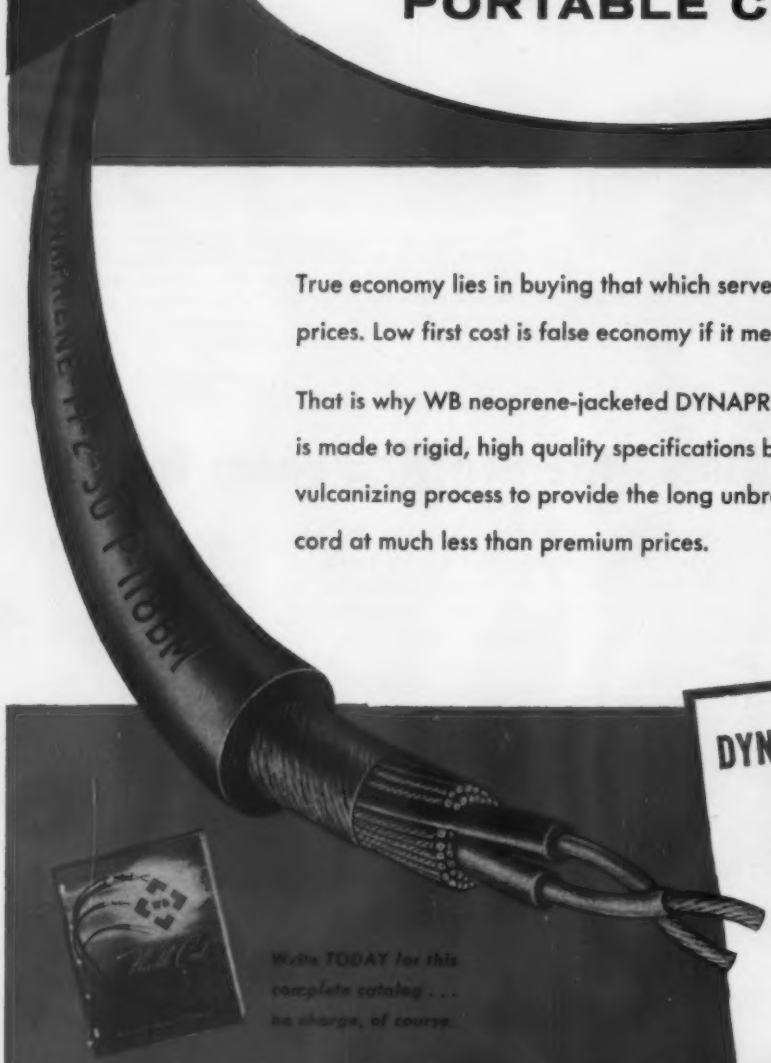
WHITNEY BLAKE

DYNAPRENE®

PORTABLE CORD

True economy lies in buying that which serves you best at reasonable prices. Low first cost is false economy if it means frequent replacements.

That is why WB neoprene-jacketed DYNAPRENE is a money saver. It is made to rigid, high quality specifications by the continuous vulcanizing process to provide the long unbroken service of premium cord at much less than premium prices.



Write TODAY for this complete catalog . . . no charge, of course.

DYNAPRENE FEATURES

- HIGH FLEXIBILITY
- LONG FLEX LIFE
- STRONG — TOUGH
- STANDS UP UNDER SHOP CONDITIONS
- FLAME RESISTANCE

Well Built Wires Since 1899

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WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

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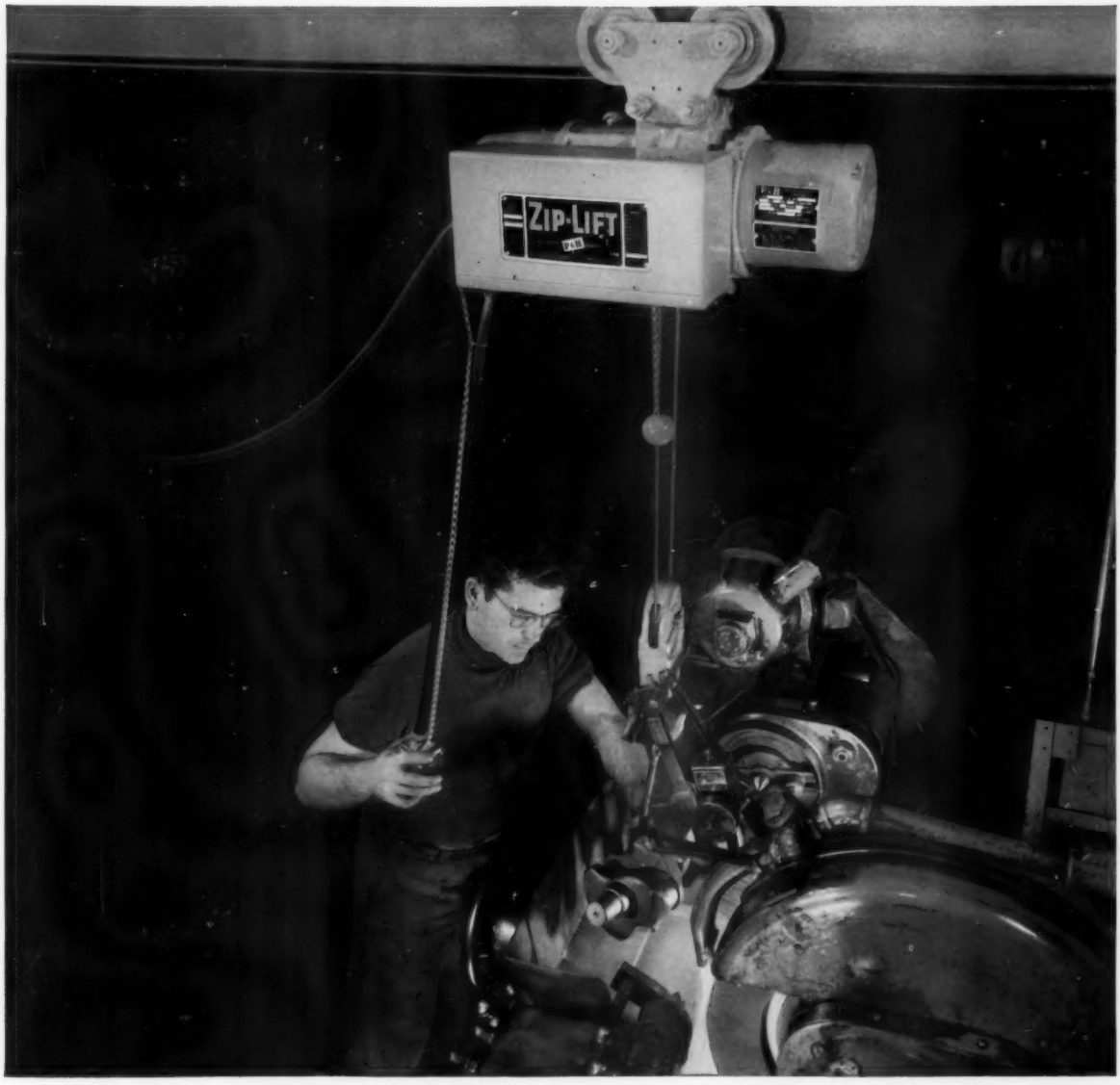

"77% greater production using P&H Zip-Lift Hoists"

—reports Wisconsin Motor Corporation

Outstanding production increase coupled with maximum safety

Production rates were boosted and work eased when P&H Zip-Lift® hoists were installed at The Wisconsin Motor Corporation. For example, on one operation, crankshaft milling, "—average output was 15 pieces an hour at a labor cost of 21¢ per piece. Now, using one P&H Zip-Lift, production has increased to 26½ pieces per hour — or 77%. We save 9¢ per piece on labor alone, or $16.66 on each 7-hour shift."

Other records reveal similar increased efficiency and safety wherever each of the 9 Zip-Lifts used by this company is located.

P&H top performance is coupled with maximum safety. In over three years operation, Wisconsin Motors has never had an accident with a P&H Zip-Lift. What's more, the press of a button replaces manual lifting . . . eases labor . . . lowers fatigue.

Find out how P&H Zip-Lift electric hoists can help save you time, labor, and money. Write today for Bulletin H-20. Department 206B, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER
P&H INDUSTRIAL DIVISION
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GENERAL ELECTRIC ANNOUNCES...
NEW Industrial
GENERAL ELECTRIC
DIRECT CURRENT MOTOR

Direct-current Motor

KINAMATIC* a new standard in direct-current motors, gives your machines wider speed ranges, greater output

To meet modern industrial needs for faster, more automatic, more continuous production, General Electric has designed an entirely new direct-current motor—the d-c Kinamatic.

Designed for Automation—Now, a direct-current motor has been designed for the modern job it has to do—either as individual motor drive or in regulating systems. The new General Electric d-c Kinamatic motor supplies the wide speed range and versatility required for today's manufacturing methods. It is designed for the close control of machines and split-second timing of processes essential to higher output.

Accelerated Production—The new d-c Kinamatic motor will modernize your equipment, give it increased power, higher speeds, greater output capacity. With the quick-acting G-E Kinamatic motor, your machines will process a greater variety of products . . . faster . . . easier . . . and with less maintenance and spoilage.

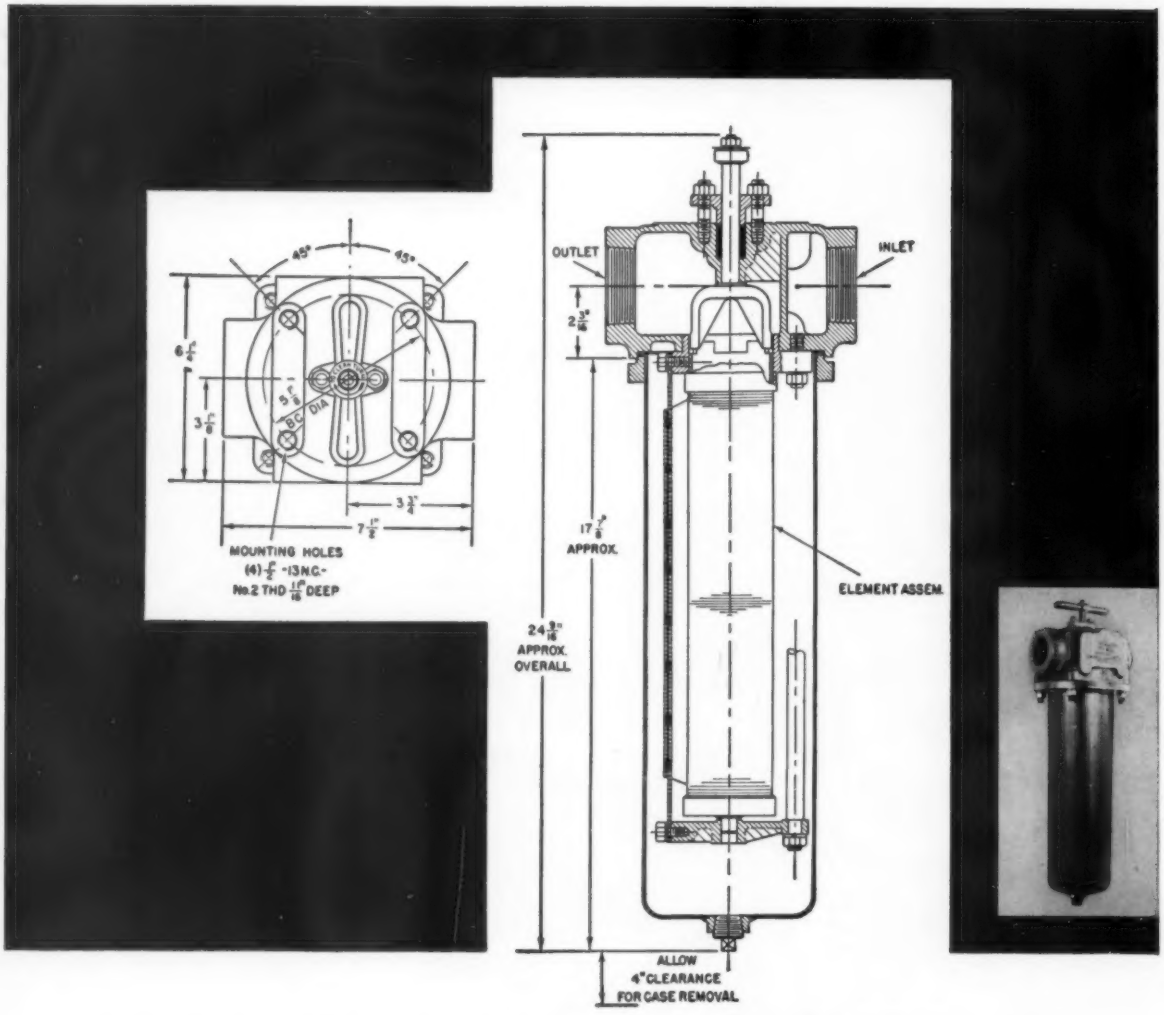
More Powerful—By combining advanced design with improved materials and manufacturing techniques, General Electric engineers have packed more power into the entire Kinamatic line. The powerful Kinamatic motor, with new stamina and durability, is ready to become one of your most effective weapons for keeping costs down, for meeting competition, for boosting productivity levels.

Engineering Help—Industrial specialists in 149 conveniently located General Electric Apparatus Sales Offices have the complete story on how the new d-c Kinamatic motors and generators can benefit your operation. For full details, contact your G-E Sales Representative, or write for Bulletin GEA-6355. *Direct Current Motor and Generator Department, General Electric Company, Erie, Pennsylvania.* 813-1

* Trade Mark of the General Electric Company

Progress Is Our Most Important Product

GENERAL ELECTRIC



Your "special" filtration problems can be solved by standard Purolator filters

FOR EXAMPLE...This one standard Purolator filter is exactly right for all these "special" filtration problems:

inks, paints,
varnishes, machine tool coolants,
greases, vitamin solutions,
as well as fuel and lube oils.

This filter's specifications may recommend it for a problem of yours. If not, you're almost certain to find a standard Purolator filter that does meet your needs—exactly.

SPECIFICATIONS...This is Purolator filter model G-141J with simplex full flow metal element oil strainers. It is designed for primary or first stage filtration and can be installed on pressure or suction side of pump. Recommended for maximum capacities of 40 to 80 GPM, dependent on spacing which varies from .003 to .010. Relief valves set from 10-12 to 50 PSI are incorporated in several models. Motor driven knife blade to clean element can be furnished whenever conditions make manual rotation impractical. Head is made of high tensile cast iron, body of drawn steel. Inlet and outlet connections are 2″, drain plugs are provided. Maximum pressure: 125 PSI; weight: 37 lbs.

Remember, if these specifications don't match your needs, there's probably a filter that does at Purolator. Find out. Send in your problem.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

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Three Rust-Oleum DIFFERENCES that save you time, money and metal!

GOES ON FASTER

No tedious surface preparations usually required — just scrape and wirebrush to remove rust scale and loose rust — then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust.

STOPS RUST

Rust-Oleum's *specially-processed* fish oil vehicle works down through the rust into the tiny, microscopic pits in the bare metal where it drives out air and moisture to *stop rust.*

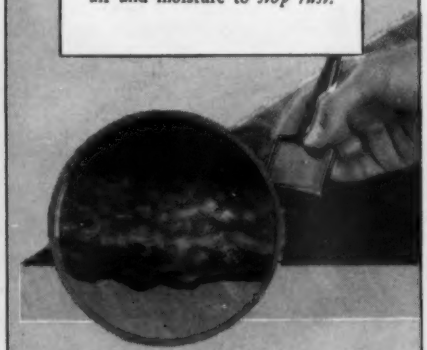
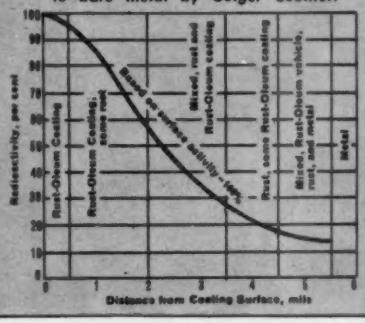
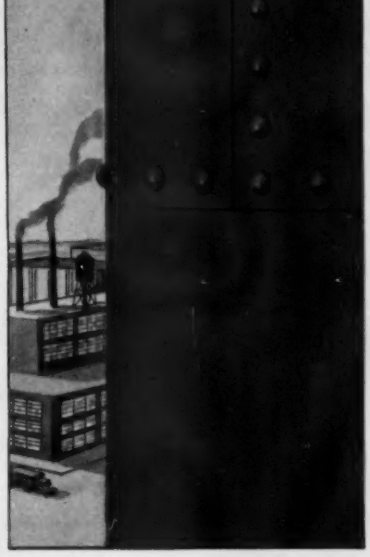


Chart shows results of tracing radio-activated Rust-Oleum through rust to bare metal by Geiger Counter.



LASTS LONGER

Applied over rust, Rust-Oleum lasts longer for the *over-the-years protection* you need. It resists sun, salt water, salt air, fumes, heat, humidity, moisture, weathering.



These are just a few of many important *differences* that separate Rust-Oleum from ordinary coatings. When you consider that Rust-Oleum covers approximately *30% more area,* depending upon surface condition and porosity . . . and the fact that Rust-Oleum finish coatings, with the same fish oil vehicle, are available in nearly every color for *double protection* . . . it's just good, common sense to use Rust-Oleum. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts.

RUST-OLEUM®

STOPS RUST!®

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

ATTACH TO YOUR LETTERHEAD — MAIL TODAY

Rust-Oleum Corporation
2606 Oakton Street • Evanston, Illinois

- ☐ Complete literature with color charts.
- ☐ 30-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.

Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

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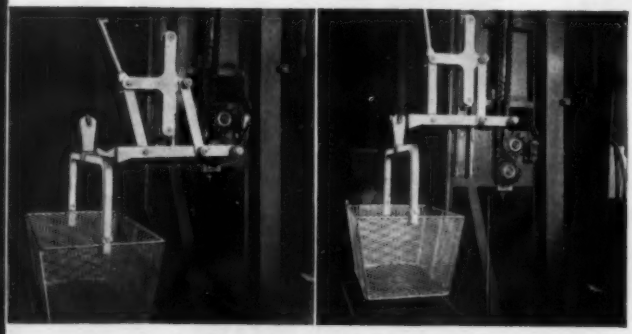
New TRANS-FREE Automatic



1 Pick up made at table near floor level, basket is loaded with parts on which intermediate work has been done.

2 Elevator arm engages crescent hook and starts basket up. Chain-drive lift is independant of overhead free-line.

Allied Conveyor System Uses Just Six Feet of Floor Space For Every Elevator Required

A recent Trans-Free installation shown here services an entire manufacturing department, yet its five work station elevators occupy a mere 30 square feet of floor space. All the rest of the completely automatic system—tracks, trolleys, load bars—is high overhead, out of the way of the work area.

With the new Trans-Free system, conveyor rail stays intact... no lowering of the track... *only the load* is transferred by elevator to floor level. Using standard track and trolley Trans-Free can be economically integrated with existing facilities.

With Trans-Free you can load to, from, and at any predetermined selection of work stations. Load timing, transfer, circulating storage, load control, dispatching and selection, all are automatic. Trans-Free gives you truly automated work handling, lowered labor costs, and is basically mechanical—so maintenance is at a minimum.

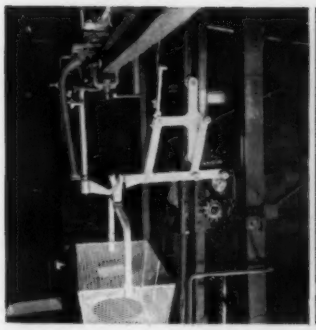
If you would like complete information on Trans-Free, simply write Allied Conveyors, or better still, next time you're in Detroit, drop in and see this unique system in actual operation. The phone number is TWinbrook 2-3040.

◀ Processed work goes up — to conveyor system 20 feet overhead.

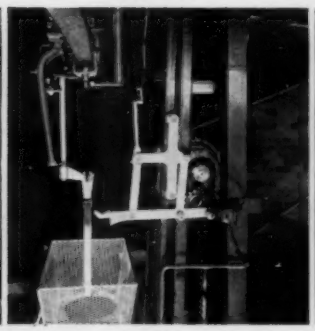
ALLIED

Installation Provides

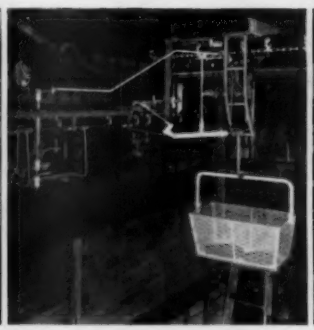
Product Handling 20 Feet Overhead



3 Out of the way 20 feet overhead, the basket is transferred to free line. Alignment devices assure positive transfer.

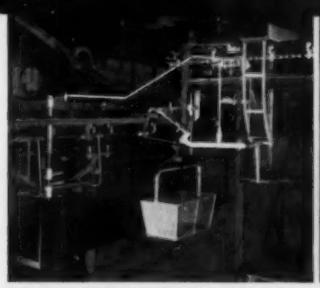


4 Elevator hook has been disengaged and free trolley takes the load and starts it toward the main conveyor line.

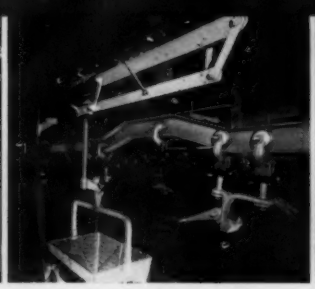


5 As load nears main conveyor it is synchronized by means of mechanical linkage to intercept an empty load bar.

6 The basket approaches in a position parallel to the main conveyor line. Incoming and outgoing loads cannot collide.



7 Travelling parallel to main line, basket is nearing transfer point. Synchronization coordinates the two lines.



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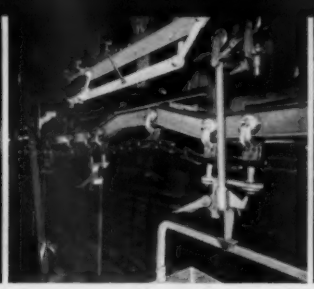

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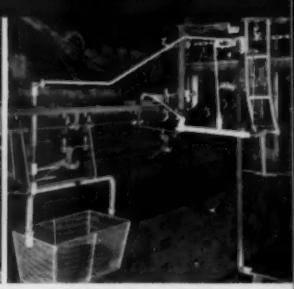

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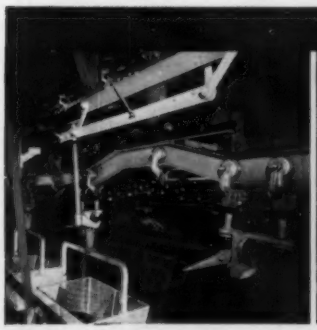

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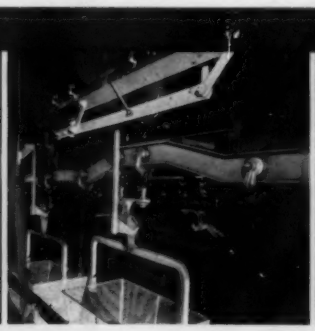

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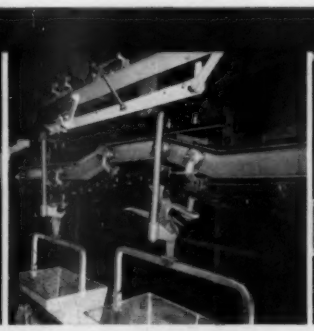

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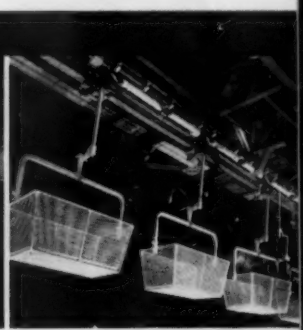


14 Loads now travel along free line to elevator pick-up and await transfer to work area at floor level 20 feet below.

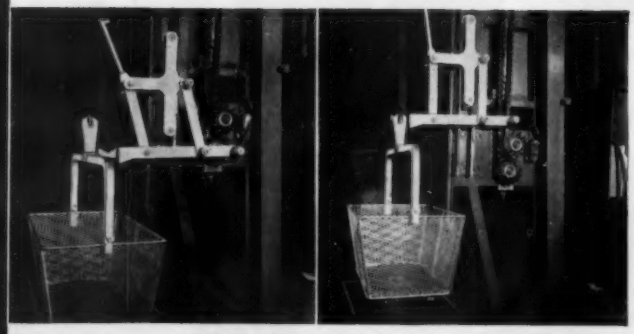
ALLIED CONVEYORS

ALLIED STEEL & CONVEYORS • DIVISION OF SPARTON CORPORATION

17357 HEALY AVENUE • DETROIT 12, MICHIGAN • CABLE ADDRESS: ALCON

For more facts circle 580 on Reply Card

New TRANS-FREE Automatic



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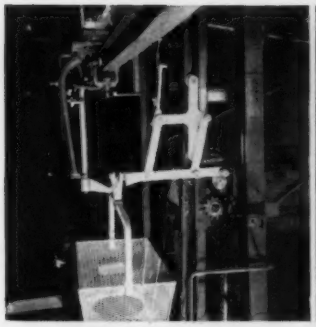

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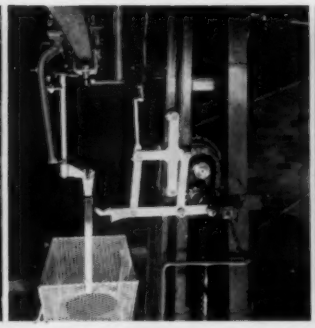

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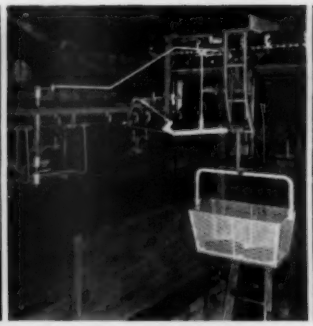

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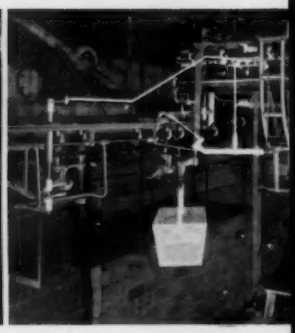

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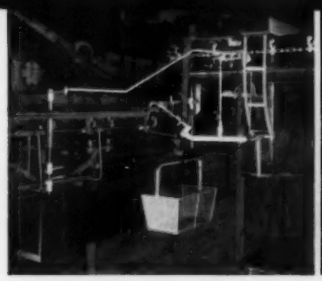

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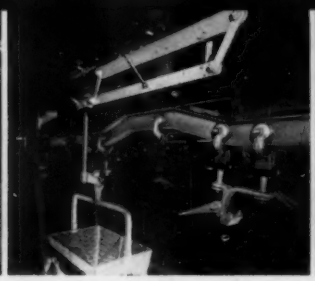

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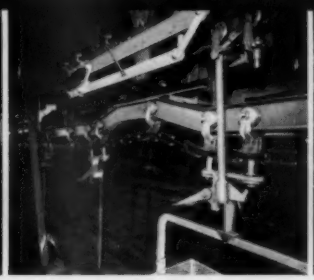

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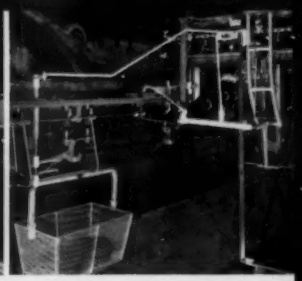

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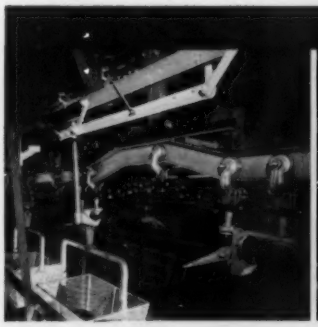

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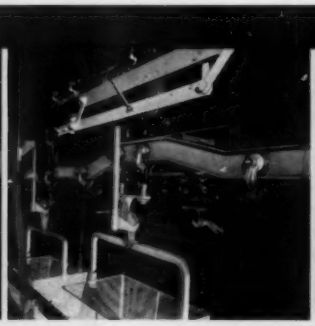

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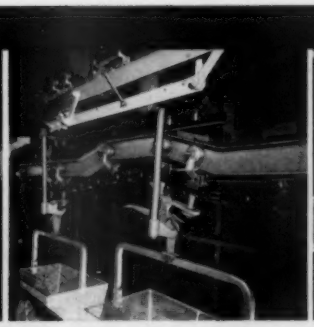

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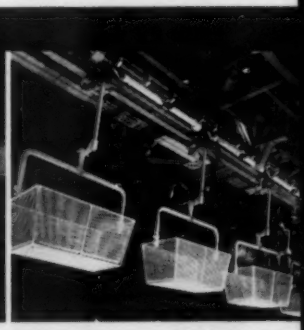

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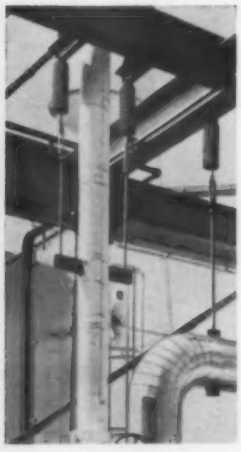
BLAW-KNOX has what it takes—to provide these products and services

Large chrome moly pipe being readied for shipment to new generating station. Making a right angle bend followed by a 24 degree, 18 foot bend in this heavy 27½ inch chrome moly pipe required all the skill and modern facilities of the Blaw-Knox power piping shop. Before shipment, piping is heat-treated and ultrasonically tested with a radar-type device for detection of any defects.

A new Blaw-Knox "6 x 6" Flexibility Matrix Method of computing stresses in power piping systems is now available to consulting engineers, companies, and individuals responsible for the design of power piping systems. By the use of an electronic computer this method cuts calculating time from months to a day; assures full accuracy to six significant figures; and has no limitations on the complexity of the system. Write for further information about our new "6 x 6" Flexibility Matrix Method.



Two-way control over movement of piping is provided by Blaw-Knox functional spring hangers with the patented internal swivel action—shown in this modern outdoor generating station. Our experienced engineers are available to both design and make recommendations for your hanger requirements. To get full information, write for Catalog No. 54.

Each year serious fire strikes one out of every seven manufacturing firms in this country. Be safe. Let a Blaw-Knox fire-protection engineer study your needs—and explain how you can pay for the system on our lease or deferred payment plan. To get more information send for Bulletin No. 2426—"Fire Can Destroy Your Business."

BLAW-KNOX

BLAW-KNOX COMPANY

Power Piping and Sprinkler Division

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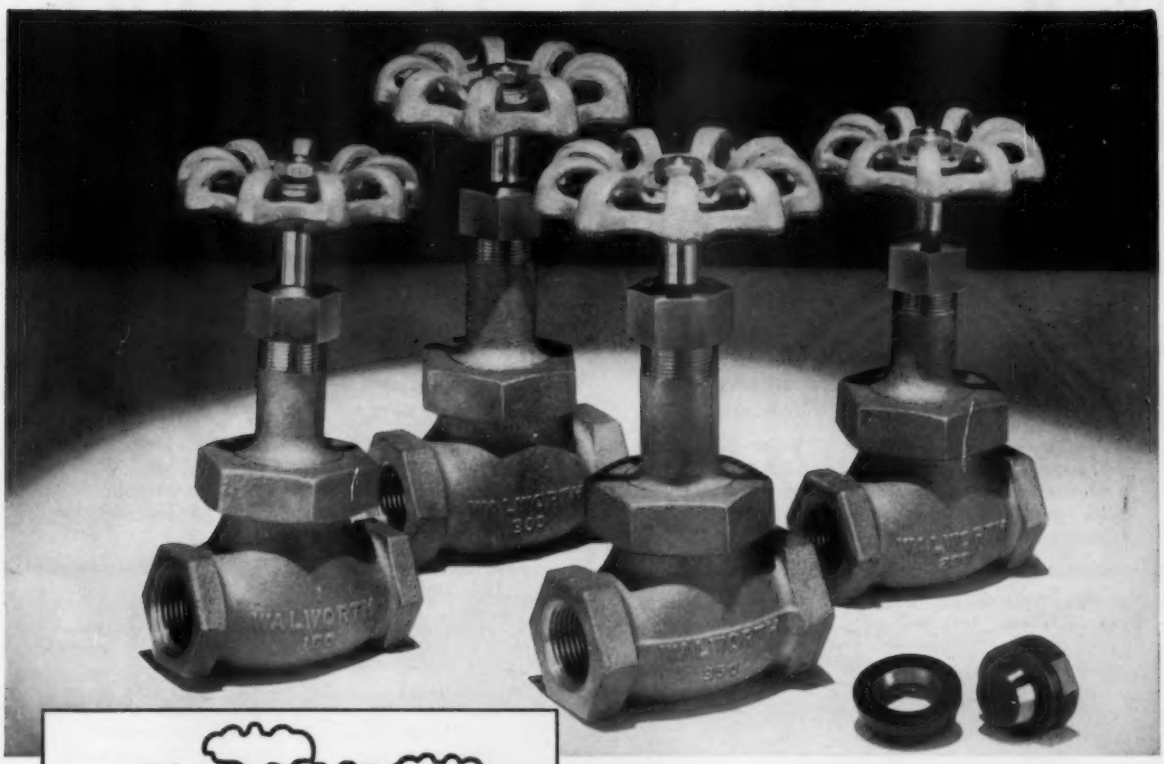
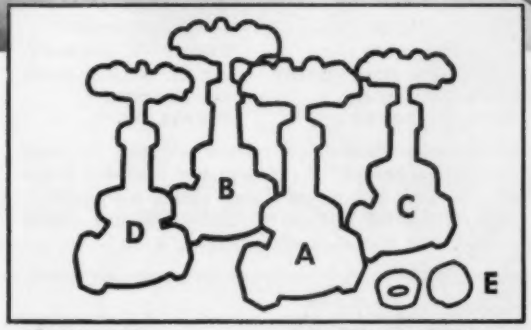
Complete facilities for prefabrication and erection of piping systems for all pressures and temperatures . . . complete line of standard and custom-engineered pipe hangers, supports and vibration eliminators . . . complete line of automatic sprinkler systems for standard and special hazards

For more facts circle 581 on Reply Card





A — No. 225P.....350 WSP 550F, 1000 WOG
B — No. 260P.....300 WSP 550F, 600 WOG
C — No. 245P.....200 WSP 550F, 400 WOG
D — No. 237P.....150 WSP 500F, 300 WOG
E — "500 Brinell" Stainless Steel Plug Type Seat and Disc

Walworth offers four lines of Bronze Globe Valves with stainless steel, plug-type seats and discs. Advantages of these valves include:

• **Stainless Steel Plug-Type Seats and Discs,** heat-treated to a minimum of 500 Brinell hardness reduces wire-drawing to a minimum. Seats and Discs are machined and fitted simultaneously, assuring perfect mating.

• **Deep Stuffing Boxes with Glands** are fitted with reinforced, molded packing. Valves can be repacked under pressure when fully opened.

For Longer Bronze Valve Life . . .

"500 BRINELL" PLUG-TYPE STAINLESS STEEL SEATS AND DISCS

150 lb. 200 lb. 300 lb. 350 lb.

• **Oversize Stems,** made of high tensile strength silicon-bronze, assure long life.

• **Rugged Body Hexes,** are flat on top; do not interfere with wrench gripping body-to-bonnet union ring connection.

• **Bodies,** made of Composition M bronze (ASTM B61), have ample wall thickness to provide high safety factor.

• **Patented Handwheels** are air-cooled and designed with a "finger-fit grip." Makes turning easy even when wearing greasy gloves.

• **Identification Plates** secured by lock-washer under stem nut, show Figure Number of valves and make re-ordering sure and easy.

FOR COMPLETE INFORMATION, SEE YOUR WALWORTH DISTRIBUTOR OR WRITE FOR ILLUSTRATED CIRCULAR

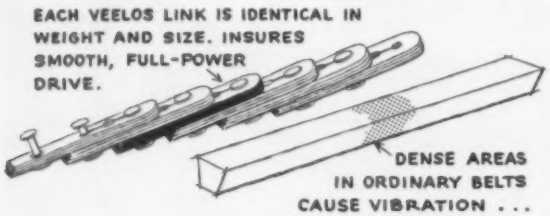
WALWORTH

60 East 42nd Street, New York 17, New York

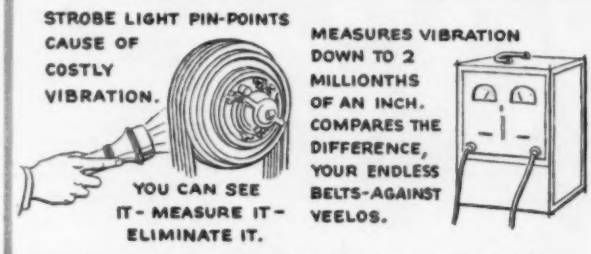
SUBSIDIARIES: ALOYCO ALLOY STEEL PRODUCTS CO. CONOFLOW CORPORATION M&H M & H VALVE & FITTINGS CO.
SW SOUTHWEST FABRICATING & WELDING CO., INC. WALWORTH COMPANY OF CANADA, LTD.

For more facts circle 582 on Reply Card

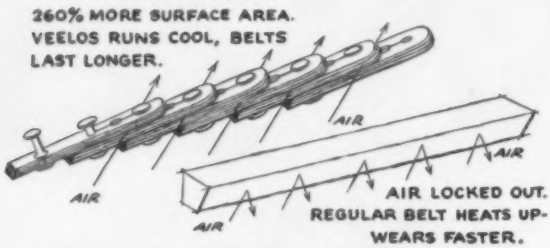
Six Reasons Why Veelos Adjustable V-Belts Are Better For Your Drives!


EACH VEELOS LINK IS IDENTICAL IN WEIGHT AND SIZE. INSURES SMOOTH, FULL-POWER DRIVE.
DENSE AREAS IN ORDINARY BELTS CAUSE VIBRATION . . . MACHINE WEAR

1. Balanced construction of Veelos Belts assures you faster, cleaner work, less rejects . . . less bearing wear. Each link and stud is identical in size and weight. Ordinary belts have varying spots of density which cause excess vibration—chatter marks, machine wear.


STROBE LIGHT PIN-POINTS CAUSE OF COSTLY VIBRATION.
YOU CAN SEE IT - MEASURE IT - ELIMINATE IT.
MEASURES VIBRATION DOWN TO 2 MILLIONTHS OF AN INCH. COMPARES THE DIFFERENCE, YOUR ENDLESS BELTS-AGAINST VEELOS.

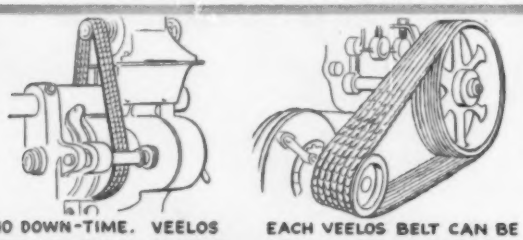
2. Electronic proof—up to 90% less vibration! With a vibration analyzer, you see, on your own machine, how Veelos belts decrease vibration up to 90% over any belt you're now using. This amazing Veelos test pin-points the belt that has the "invisible shakes."



3. Cooler running—long life! Veelos breathes! Constant circulation of air keeps Veelos running smooth. Regular V-belts have no chance to cool, heat builds up from the inside . . . causes slippage, wastes power, heats bearings, reduces belt life.

AREA CONTACT
POINT CONTACT
PERFECT VEELOS FIT. EXTRA THICKNESS AND MACHINE-CUT SIDES PREVENT BOTTOMING. MEAN CONSTANT POWER.
POWERLESS POINT CONTACT OF ORDINARY V-BELT. BULGES, SLIPS, CAUSES UNEVEN SHEAVE WEAR.

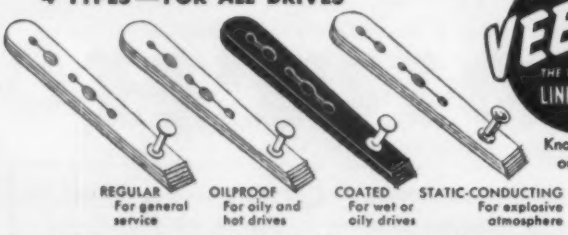
4. Greater flexibility reduces slippage! Sectional construction, beveled links allow greater flexibility, longer belt life. Each link moves around sheave independently and maintains full contact, constantly. Full area contact allows shorter centers, smaller sheaves.


NO DOWN-TIME. VEELOS FITS ANY DRIVE - WITHOUT DISMANTLING.
EACH VEELOS BELT CAN BE ADJUSTED - NO NEED FOR EXPENSIVE MATCHED SETS.

5. Simple installation "knocks out" down-time! Saves up to 50% installation time on outboard bearing drives, more when belt length isn't in stock. No resetting, tilting or moving motors. Veelos can be made any length, can be changed by adding or removing links.

6. Veelos won't stretch any more than ordinary endless V-belts when it is properly installed. *Remember—measure Veelos 1" short per foot and roll on drive as tightly as possible.* With the first few revolutions Veelos studs accept a permanent set into the sections they connect.

4 TYPES—FOR ALL DRIVES


REGULAR For general service
OILPROOF For oily and hot drives
COATED For wet or oily drives
STATIC-CONDUCTING For explosive atmosphere

VEELOS
THE BALANCED LINK V-BELT
Known as Veelink outside U.S.A.

Write for free Veelos Data Book or Veelos Vibration Demonstration to:

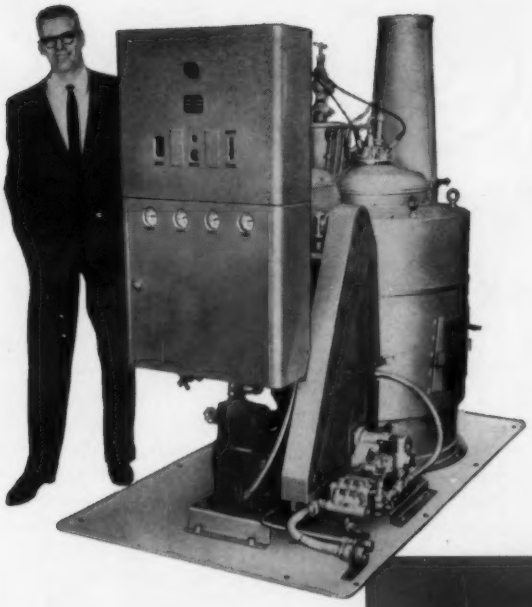
MANHEIM
Manufacturing & Belting Co.
404 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists Since 1911"

For all sizes and types of drives. Double-V available for serpentine drives.

© M.M.&B. Co. 1956

For more facts circle 583 on Reply Card



don't use floor space for your boiler room

VAPOR MODULATIC

WATER TUBE BOILER

you can put it on the roof— on a balcony—or hang it from the ceiling

PAY FOR YOUR STEAM THRU FLOOR SPACE SAVED!

OVER 13,000 SATISFIED USERS

produces up to 4 h.p. per sq. ft. of area

- Develops up to 27 H.P. per 1000# of weight.
- Produces up to .6 H.P. per *cubic ft.* of space used.
- Needs only 15" above top of boiler for maintenance. No additional floor space needed.
- Can produce 10% or more above ratings, continuously.
- Full ASME approved.
- It is a complete package unit.
- Proved by 25 years in America's toughest boiler rooms.

8 sizes: 10 to 160 H.P.

Pressures: 5 to 900 psig.

Write for complete specifications on the boiler that requires less space and permits lighter floor structure—The Vapor Modulatic.

VAPOR HEATING CORPORATION, 80 E. Jackson Blvd., Chicago 4

Dept. 18-F

Send me Modulatic Bulletin No. 586.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

For more facts circle 584 on Reply Card

NOW!

A TWO-TON LIFT

WITH HUSKY 100-POUND AIR HOIST

New Keller Tool air hoist weighs 100 pounds . . . raises a 4000-pound load at 10 feet per minute. Hoist is strong and powerful enough to handle the 2-ton load with complete safety.

New 2-ton hoist is powered by high-torque, axial-piston compressed air motor for positive starts and stops. A centrifugally governed, fully mechanical brake prevents slippage. Length of lift is 8 feet. Hook-to-hook dimension is only 23½ inches.

Has all the outstanding features of the Keller Tool air hoist line:

Lightweight—easy to move and hang.

Variable Speed—from creep to maximum.

One-Hand Control—of lifting, lowering, spotting.

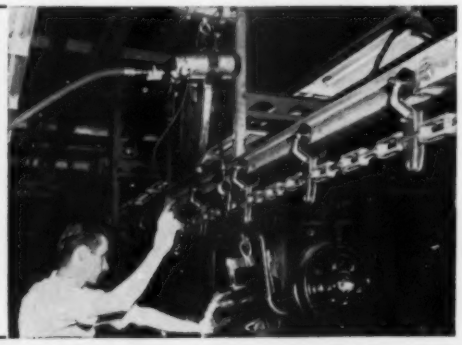
Safe in Heat or Dust—air motor doesn't spark . . . won't heat up.

Economical Operation—air consumption is low . . . requires little servicing or maintenance.

Operator Safety—powerful brake holds load regardless of air supply. An exclusive feature of the new two-ton hoist is a safety cable hole that provides extra safety for load and operator.

Keller Tool air hoists are available in lifting capacities of 150 . . . 300 . . . 500 . . . 1000 . . . 2000 . . . and *now* . . . 4000 pounds. Write for Bulletin 86.

Keller Tool air hoist, keeping pace with assembly line conveyor, lifts rear axle assemblies onto conveyor hooks.



ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

For more facts circle 585 on Reply Card

THIS COOLING TOWER HOUSING IS fireproof,
corrosion-resistant and virtually maintenance free
Cooling tower in photograph above constructed by Phillips Cooling Tower Co., Inc., Brooklyn, N.Y.

It's made of J-M Transite®

Corrugated asbestos-cement sheets

Johns-Manville Transite offers many outstanding advantages for constructing cooling tower housings. This time-tested material provides the ideal combination of properties needed for such rugged service.

It's Fireproof—Completely inorganic, Transite can't burn or support flame . . . greatly reduces the ever-threatening hazard of rooftop fires.

It Resists Corrosion—Transite is unaffected by weather, moisture and most corrosive elements found in industrial atmospheres.

It needs no Maintenance—Transite never needs painting or other protective coating under normal operating conditions . . . its high strength provides long life.

It's Attractive—A soft natural grey in color, Transite blends perfectly with modern architecture. In corrugated or flat form, Transite towers make an attractive addition to most buildings.

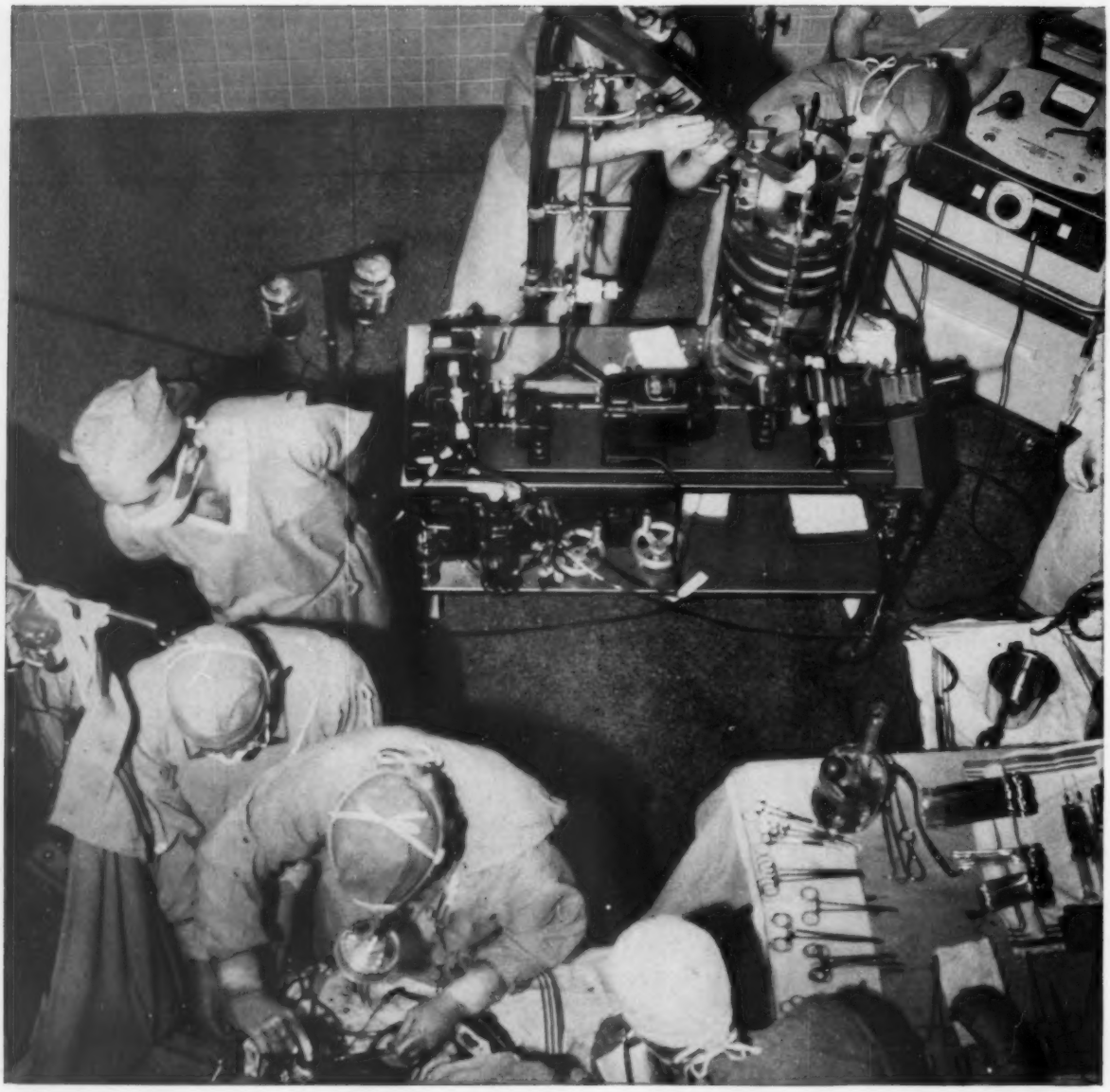
Write for further information—For further data and names of manufacturers who can supply cooling towers made of J-M Transite, write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

JM PRODUCT

Johns-Manville TRANSITE

THE MODERN MATERIAL FOR COOLING TOWERS

For more facts circle 586 on Reply Card



Leland Motors circulate blood for "stopped heart" surgery

Combining their knowledge and skills the University of Minnesota and Sigmamotor, Inc., have perfected an ingenious heart-lung machine which permits a surgeon to stop a beating heart, open it and then work inside for extended periods of time.

The new equipment, representing a great advance in direct-vision, intracardiac surgery, circulates the patient's blood through an oxygenator and back through the patient, completely by-passing the stilled heart. *The circulating pumps are powered by a ⅓ hp Leland explosion-proof motor.*

Next time *you* need a motor you can depend on—look to Leland. You'll find Leland knows how to make motors to answer your specific needs. For more information on the complete line of Leland motors and generators, write the address below today.

Leland explosion-proof motor, capacitor-start, induction-run. 115/230V, 4-pole double shaft. Underwriters Listed Class I, Group C (for atmospheres containing ethyl ether vapors, ethylene, or cyclopropane).

Another AMF Product
LELAND MOTORS

THE LELAND ELECTRIC COMPANY
Dayton 1, Ohio
Division of AMERICAN MACHINE & FOUNDRY COMPANY

For more facts circle 587 on Reply Card

G-B SNAP-ON DISTRIBUTORS

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, Ball Distributing & Engr. Co.
ATLANTA, Ga., Southern States Iron Roofing Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply
Southern States Iron Roofing Co.
BROOKLINE, Mass., Homans-Kohler, Inc.
BUFFALO, Frontier Insulation & Supply Co.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHARLOTTE, N. C., Guy M. Beaty & Co.
CHATTANOOGA, Guy M. Beaty & Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBIA, S. C., Southern States Iron Roofing Co.
COLUMBUS, Santeler Brothers
DALLAS, Insulation Supply Co., Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DETROIT, Coon-DeVisser Co.
EL PASO, Insulation & Specialties Co.
FARGO, N. D., Smith, Inc.
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
IRON MOUNTAIN, Mich., Champion, Inc.
JACKSON, Miss., Paine Refrigeration Supply Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Southern States Iron Roofing Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher
NASHVILLE, Southern States Iron Roofing Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, Dravo Corp.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Southern States Iron Roofing Co.
RICHMOND, Va., Southern States Iron Roofing Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Southern States Iron Roofing Co.
SEATTLE, Western Fibrous Glass Products
ST. LOUIS, A. G. Brauer Supply Co.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Capital Refrigeration & Supply
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, Walter E. Campbell Co., Inc.
WICHITA, Jamar-Olmen Construction Co.
VANCOUVER, B. C., Fleck Brothers Limited

*How to insulate pipe better— and quicker than you can say "SNAP*ON"!*

"Snap*On" is the name, and that's the way you apply it — simply spread the single seam and snap it over hot or cold piping. Result: you save heat and cold, time, and money with this unique one-piece pipe insulation molded of fine glass fibers.

A list of Snap*On's other properties reads like a "pipe dream" come true: It's 4 to 10 times lighter than conventional insulations! It comes in 3-foot and 6-foot monolithic sections, in sizes up to 33 inches! It's resilient, tough, shockproof, permanent! Its thermal efficiency is superior to that of any other general purpose pipe covering on the market!

Small wonder that Snap*On continues to capture an ever-growing share of the pipe insulation market . . . and that a new production line goes "onstream" this month to help keep pace with the spectacular demand.

Snap*On distributors in 62 cities can furnish you samples, prices, and delivery from local stocks. Call your local distributor today (listed in adjoining column), or write for Snap*On brochure.

GUSTIN-BACON *Manufacturing Company*

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings
Molded glass fiber pipe insulation

244 W. 10th St. Kansas City, Missouri

*Reg. Trademark

For more facts circle 588 on Reply Card

The Sirocco Wheel—Designed with a multiple number of narrow, curved blades, forward pitched. Operating at low rotative and peripheral speeds, it delivers more air per revolution than any other type of fan.

The HS Wheel—Medium-speed wheel with true non-overloading power characteristic; features large-area die-formed blades, mounted in backwardly inclined position between heavy-duty backplate and streamline rim.

Match the wheel to the job . . . with rugged, quiet American Blower Sirocco and HS Fans!

American Blower fans have Certified Ratings for dependable performance.

American Blower's complete line of fans lets you match the wheel to the duty, whether it's ventilating, air conditioning, heating; or drying, fume-removal, and processing systems. Their heavy-duty design and construction assure you of long fan life with a minimum of maintenance. Take the Sirocco and HS fans, for example:

Sirocco and HS fans offer smooth, quiet air delivery, high operating efficiency and dependable service. They are available in 25 standard sizes from 12¼″ to 132″ wheel diameters for volumes to over 700,000 CFM.

Precision-built Sirocco and HS fans can be specified in single or double inlet and in any of eight standard discharges, with ball, roller or sleeve bearings as required. Inlet vanes, dampers or Gýrol Fluid Drive can be furnished to meet volume control requirements. Larger sizes are designed so that they can be dismantled for easy handling in shipment, erection and maintenance.

Get details on the complete line of American Blower fans. Call our nearest branch office; or write direct to American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of AMERICAN-Standard

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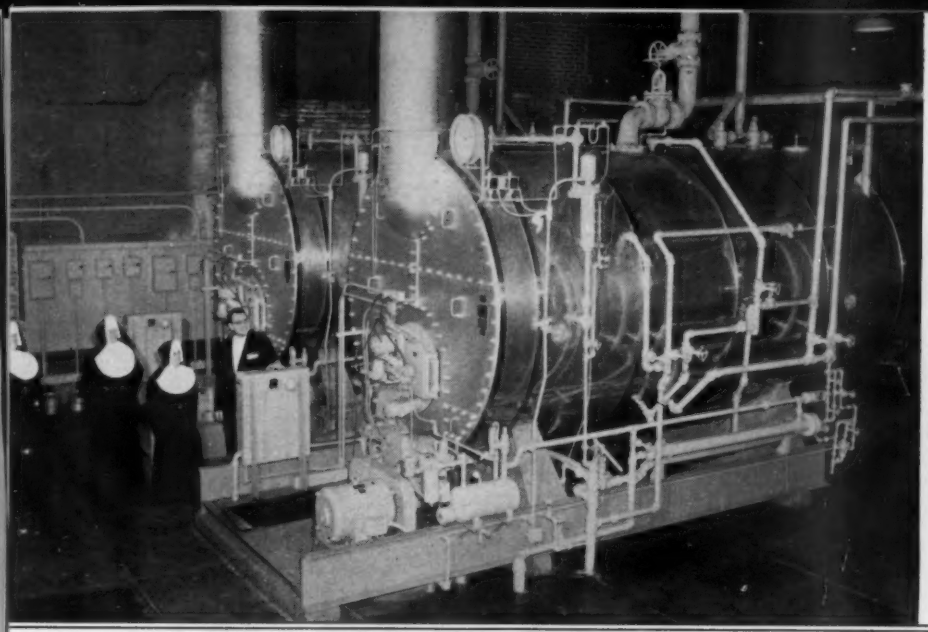
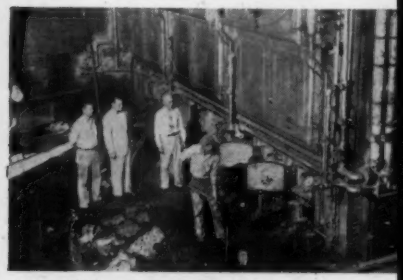


NEW BOILERS combine efficiency and handsome appearance. Edward S. Green, Edgemont (Pa.), contractor, was responsible for this superior installation. Pictured left to right are: Sister M. Cor Immaculatum, Immaculata College Treasurer, Sister Jean Marie, Community Treasurer, Reverend Mother Maria Alma, Superior General and Salvatore S. Guzzardi, Consulting Engineer.



OLD BOILER was a coal-fired HRT model — typical of many replaced by modern Cleaver-Brooks oil, gas or combination oil/gas fired boilers.

Consulting engineer* tells how Immaculata College boiler modernization saves estimated $12,000 each year

Salvatore S. Guzzardi CONSULTING ENGINEER

2928 LEWIS TOWER · PHILADELPHIA 2, PA · KINGSLEY 6-2777

December 20, 1956

Mr. John C. Cleaver, President
Cleaver-Brooks Company

Dear Mr. Cleaver:

Recently our office was retained to make an impartial, exhaustive engineering study of the 40-year old boiler plant and steam system at Immaculata College, Immaculata, Pa., which is staffed by the Catholic order, Sisters of the Immaculate Heart of Mary.

As a result of our recommendations, two fully automatic, oil-fired, 350 bhp Cleaver-Brooks package steam boilers, (12,000 lbs/hr steam each), replaced three hand-fired coal boilers and steam-driven auxiliaries. The new boilers are operating at approximately 80% boiler efficiency year-round.

Conversion of coal firing to automatic #6 oil firing and increased boiler efficiency has reduced the fuel cost approximately 50% -- amounting to a saving of $12,000 each year.

The Cleaver-Brooks boilers burn #6 oil and operate automatically at 80 pounds steam pressure 'round the clock -- without the presence of operators in the boiler room. Eliminating boiler plant labor saves the College $7,500 each year.

The cost of the boiler plant modernization will be paid for out of fuel and labor savings in approximately 2-1/2 years.

Commendation for this outstanding performance of the Immaculata boiler plant is due to your well-engineered boiler design and to the cooperation of your skilled servicemen. The results achieved were so impressive that the Sisters subsequently modernized their Villa Maria Convent, Westchester, Pa., with two 100-bhp Cleaver-Brooks boilers.

Sincerely yours,

Salvatore S Guzzardi

***Salvatore S. Guzzardi** — Award-winning head of an organization of experienced professional engineers specializing in modernizing power service facilities. Clients include: Pennsylvania University, Baldwin-Lima-Hamilton Corp., H. Daroff & Sons, Sun Shipbuilding & Dry Dock Co. and City of Philadelphia.

Surveys show 32% of boilers now in service are 30 years old; 56% are over 20 years old

If your boiler fits this description, we recommend an immediate survey. "In 90% of the plants surveyed," summarizes Mr. Guzzardi, "we have found it possible to save thousands of dollars and to pay for the recommended improvements out of annual savings within one to three years."

Again and again the proved economy of Cleaver-Brooks four-pass, forced-draft boiler design results in savings reports as impressive as this. Contact your nearest Cleaver-Brooks representative for more facts on the complete line of steam and hot water boilers — 19 sizes, 130 models, 15 to 600 hp — for heating or processing. Or write Cleaver-Brooks Company, Dept. F. 364 E. Keefe Ave., Milwaukee 12, Wis., U.S.A. Cable Address: CLEBRO — Milwaukee — all codes

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

For more facts circle 590 on Reply Card

BENJAMIN

always the source of Good Lighting . . . anywhere in the plant!

If you could look at your factory with the roof off like this you'd get an idea of the many different lighting units it takes to provide the right light for every seeing task. When you specify BENJAMIN you are assured of a specially-engineered unit for every factory and office location—designed for better seeing with maximum eye comfort.

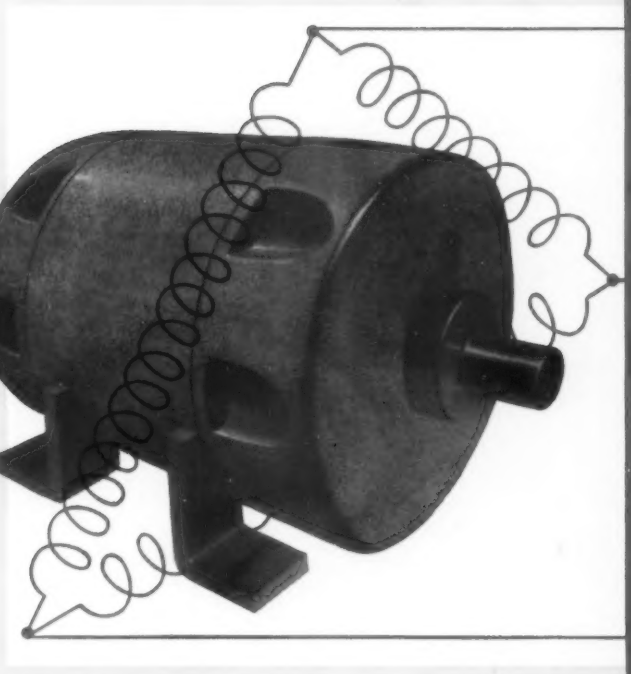
Send for illustrated data bulletins on any or all of the units shown here. Benjamin Electric Mfg. Co., Dept. PE, Des Plaines, Illinois

1. Explosion-Proof Units
2. Vapor-Tight Incandescent
3. Triple-Flo Continuous Lines
4. Stream-Flo Continuous Systems
5. Stream-Flo w/27° Shielding
6. RLM Dome Reflectors
7. Stream-Flo w/Plastic Covers
8. Elliptical Angle Reflectors
9. Steelite Armor-Clad Units
10. Twin-Flo Individual Units
11. Symmetrical Angle Units
12. Semi-Direct Industrial w/25% Uplight
13. Twin-Flo w/10% Uplight
14. Panel-Glo Safari Systems
15. Stock-Bin-Lite
16. Officer Louvered Units
17. Panel-Glo Corrugated Systems
18. Glass-Enclosed Troffers
19. RD Projectors
20. Duo-Service Floodlights

R-133

For more facts circle 591 on Reply Card

For more facts circle 592 on Reply Card →



SIMPLE DEPENDABLE protection against phase failure and phase reversal

A-B protector opens control circuit in 3 to 4 cycles...under all load conditions

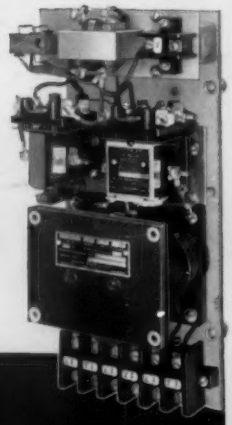
When men, motors, or the driven machines can be "hurt" by "phase failure" or "phase reversal" . . . the new Allen-Bradley Bulletin 812 should be used as a low cost and reliable "safety" insurance. It detects phase failures and reversals electrically, and within not more than 3 or 4 cycles, opens the motor control circuit—regardless of motor load (including no load)—and thus stops the motor.

The Bulletin 812 Type A relay protects motors against all phase failures. The Type B relay protects motors against loss of a phase and reversed phase rotation. For the first time, dependable protection is provided for motors supplied by Wye-Delta and Delta-Wye power systems having the neutral ungrounded or not connected to the circuit.

Bulletin 812 relays offer positive protection against motor or machine damage due to opening a primary line—and under all "load" conditions. No field adjustment is required. Remote reset is inherent. Furthermore, as a static device which does not rely for its operation on "motor" revolution the possibility of failure to operate is eliminated.

Bulletin 812 relays are built in four sizes which will reliably protect motors with full load currents from 1.25 amperes to 300 amperes. Let us send you more information about this dependable answer to phase failure and phase reversal problems.

Bulletin 812 Type A phase failure relay protects a 3-phase motor against loss of a phase.



Bulletin 812 Type B phase failure and phase reversal relay protects a 3-phase motor against both loss of a phase and phase reversal.

ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

A-B Quality

Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.

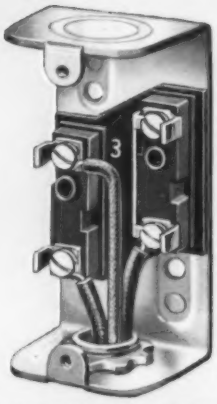
In Canada—
Allen-Bradley Canada Ltd.
Galt, Ontario

7-57-M

new Allen-Bradley Bulletin 800 Standard-duty Push Buttons

CAN BE WIRED IN HALF THE TIME!

CONTACT MECHANISM IN THE COVER—COMPLETELY PROTECTED FROM CARELESS SCREWDRIVERS AND CARELESS WIRING.



WIRING TERMINALS IN THE BASE —COMPLETELY EXPOSED FOR EASY WIRING.

Here's an entirely new idea in push button stations—a wrap-around cover which contains and protects the contact mechanism. Removing the cover exposes all terminals for instant and easy wiring. Heavy, silver plated contacts connect the push button assembly in the cover with the terminals in the base.

Matching ribs in the cover and notches in the molded terminal base eliminate the possibility of having wiring connections made incorrectly. A molded, bakelite shield protects the contact mechanism and prevents careless wiring from interfering with contact operation. All push button contacts are silver and of the double break construction.

Specify the new Allen-Bradley standard-duty station on your next order. Its installation time-saving feature, alone, should make you a regular customer!

Bulletin 800 standard-duty push buttons—with strong, gray, molded cover are "good-looking" and "safe" in operation. All stations have dual knockouts, top and bottom.

7-57-M

SELECTOR SWITCH

You can't beat this for convenience—a selector switch with the same easy-to-wire construction as the push buttons, shown above—plus the feature that you can change—*in seconds*—from two position to three position (or vice versa)! The correct name plate is furnished with each switch. See for yourself how easily this is accomplished.

CHANGE IT FROM 2 POSITION TO 3 POSITION (or vice versa)...in 30 Seconds!

A-B Quality

ALLEN-BRADLEY

QUALITY

MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ontario

"See! Only 30 seconds to fog this room!"

THAT's how quickly you can control insects in 10,000 cubic feet of space with WEST ATOMIZERS and potent, penetrating VAPOSECTOR insecticide.

Insects have no place to hide. VAPOSECTOR penetrates everywhere:

– cracks and crevices
– even remote hiding places.

Insects have no time to escape. VAPOSECTOR penetrates their outer skin for a quick, permanent kill. Yet it's safe to use. Odorless and nontoxic when used as directed.

INSECT control is economical – when VAPOSECTOR is used in a WEST ATOMIZER. Only one or two ounces control all insects in 1,000 cubic feet of space. In just 3 seconds. At a cost as low as 5¢.

William D. Wagner
SERVICE SUPERINTENDENT
Bowman Biscuit Company
Denver, Colorado

"We know of no safer insecticide than Vaposector"

"Quality and uniform consistency is what we sell – and also what we buy when it comes to proper insect control in our plants. We have found that West's Vaposector insecticide is the most effective, economical, and above all, the safest insecticide available to us," says MR. WILLIAM D. WAGNER, Service Superintendent of Bowman Biscuit Company, Denver, Colorado.

"West's trained specialists have helped us install a control program which has proven simple to enforce, economical to operate, and has provided us with greater protection than we've ever before enjoyed. Our program has enabled us to maintain the highest quality standards at lowest possible costs."

Would a similar program interest you? Send the coupon.

LARGEST COMPANY OF ITS KIND IN THE WORLD

WEST DISINFECTING Company

WEST DISINFECTING COMPANY, 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal

☐ Please send your 32 page booklet, "Industrial Insect Control."
☐ Please have a West representative telephone for an appointment.

Name.....

Position.....

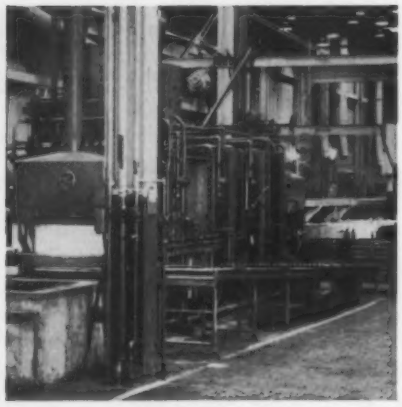
Mail this coupon with your letterhead to Dept. 19.

For more facts circle 593 on Reply Card

STEELCOTE MAINTENANCE NEWS

1957 FEATURING THE LATEST COST REDUCERS IN MAINTENANCE 1957

NEW PAINT FOR MACHINERY, EQUIPMENT AND STRUCTURAL STEEL HOLDS 10 PERFORMANCE RECORDS



Steelcote EPO-LUX 100, the latest product of paint research, is the most chemically resistant type air dry organic finish known. Its resistance to acids, alkalis, salt and solvents exceeds any other type paint. Other new records achieved by EPO-LUX 100 are: Superior adhesion, impact and abrasion resistance; unexcelled gloss; 75% of hardness of glass without brittleness. Brush or spray application. For recommendations on use of EPO-LUX 100 in your plant, write us describing your problem.

Steelcote FLOOR-NU Patches and Resurfaces Where Chemicals and Abrasion Destroy Concrete, Wood, Metal Floors, Walls and Tile Grout

Where heavy trucking, abrasion, acids, salts, solvents or alkalis ruin structural surfaces, new patent-applied-for FLOOR-NU makes a tight bond repair or resurfacer that defies these abuses. It will not shrink. Can be feather edged. Comes ready to trowel. Five times stronger than concrete. Can be trucked overnight. Not an asphalt product.

Thickness of ⅛" Sufficient for Heavy Trucking. No Need to Move Machinery.

FOR PAINT ENGINEERING RECOMMENDATIONS ON ANY MAINTENANCE PROBLEM, WRITE DEPT. 11 DESCRIBING PROBLEM

Steelcote MFG. CO., 3418 GRATIOT, ST. LOUIS 3, MO. U.S.A.

JOBBERS IN PRINCIPAL CITIES

IN CANADA: STEELCOTE MFG. CO., LTD., RODNEY, ONTARIO

For more facts circle 594 on Reply Card

STEELCOTE EPO-LUX ZINC RICH Z-D PRIMER GIVES CATHODIC ACTION OF GALVANIZING

Costs Approximately 2/3 Less Than Hot Sprayed Zinc

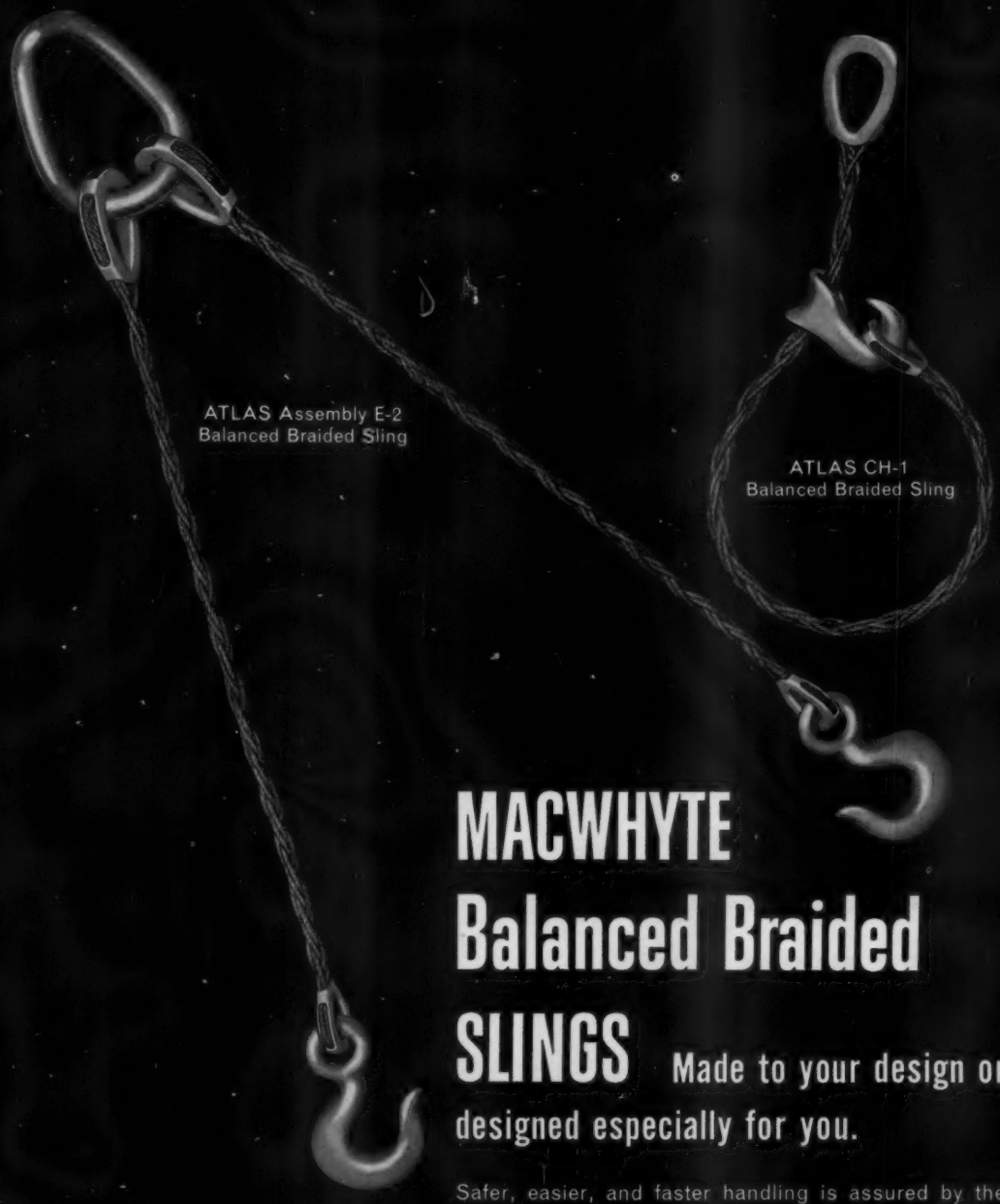
The unequalled rust inhibitive qualities of zinc have been established by the universal usage of galvanizing. Now this same type protection can be given steel in on site application without vulnerability of the zinc to attacks of acids and alkalis. Now for the first time you can apply by brush, spray, or roller a coating of over 90% pure zinc metal. It has such tremendous adhesion that overcoats of EPO-LUX 100, resisting acids and alkalis can be added, assuring the longest-lasting and most effective corrosion prevention possible.

FOR MOST SATISFACTORY PAINTING OF WET WALLS

America's Quality Leader is STEELCOTE DAMP-TEX

Transforms wet dingy surfaces into cheerful porcelain-like beauty. DAMP-TEX permits surface moisture to escape. Then it dries into a hard, porcelain-like enamel film that withstands repeated washings for years. Fungus and bacteria killer can be added to DAMP-TEX before application to assure maximum sanitation.

For more facts circle 595 on Reply Card



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Made to your design or designed especially for you.

Safer, easier, and faster handling is assured by the Macwhyte Method of fabrication which produces a lightweight, flexible, kink-resistant sling.

Standard design or special design of Macwhyte Slings are available in a wide range of types and sizes.

General information, sizes, and rated capacity of slings at various angles of use are given in Bulletin 5308R. Ask for your copy.

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2906 Fourteenth Avenue, Kenosha, Wisconsin
Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope, and Wire Rope Assemblies. Special catalogs available

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11198

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SCAFFOLD-ON-WHEELS

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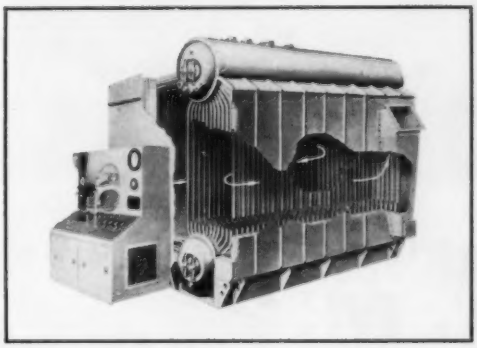
For more facts circle 596 on Reply Card

Architect's rendering of the Lake Meadows project. Skidmore, Owings and Merrill, Architects.

Chicago's newest planned community is served by C-E Boilers



Cutaway view of typical VP Boiler. For capacities from 4,000 to 40,000 lb of steam per hr. Pressures to 500 psi. Oil or gas fuel.

Firing aisle of the Lake Meadows boiler room showing three of the five C-E Package Boilers, Type VP.

Located on a 100 acre site overlooking Lake Michigan, Chicago's newest planned community, the Lake Meadows project, offers gracious living within the confines of a large city. Owned and managed by the New York Life Insurance Company, Lake Meadows provides distinctively appointed apartments, spacious grounds, a modern shopping center, ample parking facilities, yet is within minutes of the heart of the city. When completed, this project will house 2000 families and will include an eight acre park. Construction has already begun on a new elementary school located on two acres adjacent to the housing development.

A project of this size requires considerable steam capacity to provide ample heat and hot water as well as to perform the many other services required. To do the job, the New York Life Insurance Company originally selected three C-E Package Boilers, Type VP. Later, as new housing units were added, two additional VP Boilers were installed. Their outstanding performance and efficient, trouble-free operation is evidenced by the repeat order placed with Combustion for the final two units.

Complete information on C-E Package Boilers is available in Catalog VP-3. Write for your copy.

COMBUSTION ENGINEERING

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

Canada: Combustion Engineering-Superheater Ltd.

B-986A

C-E

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS, PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

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Do you worry about power distribution problems

AT 3:00 A.M.?

If you have a power distribution system problem — either in an old building or in that new one you're planning — here's one way you can stop losing sleep over it. Just use Rockbestos A.V.C. (asbestos, varnished-cambric insulated) Interlocked Armored Cable. It will help you cut costs and at the same time assure you dependable service. Here's why:

- Rockbestos A.V.C. Interlocked Armored Cable gives you more current capacity than cable in conduit or other armored cable. Single conductors are standard N.E.C. Type AVA power cables.
- You save important dollars by eliminating the need for costly conduit or ducts.
- It's easily installed on racks or hangers beneath the ceiling or next to walls.
- It can be installed up, down or around walls, beams or posts.
- It cuts installation time and permits quick, easy repairs.

Get all the details on Rockbestos A.V.C. Interlocked Armored Cable — Write now for catalog which gives complete specifications and application data.

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A.V.C. Interlocked Armored Cable

For New Buildings, Expanding Existing Circuits, Relocating Old Circuits

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PANELS AND FIXTURES

...when you want to "hang it all!"

Tools...patterns...small parts. Plans...designs...drawings. Posters...displays...notices.

Hang them all on Masonite® Peg-Board® panels with Peg-Board interchangeable fixtures. Help keep plant operations flexible. They're easy to put up and take down. Easy to paint. Thicknesses for normal and heavy-duty use.

See your lumber dealer for Peg-Board and other Masonite hardboards.

®Masonite Corporation—manufacturer of quality panel products

Many more cost-cutting uses for Masonite panels:

- Partitions
- Work surfaces
- Pallets and trays
- Mats and runners
- Bins and cabinets
- Chutes and conveyors
- Safety guards

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Please send me your free booklet on factory methods and Masonite panels.

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City.....*State*.....
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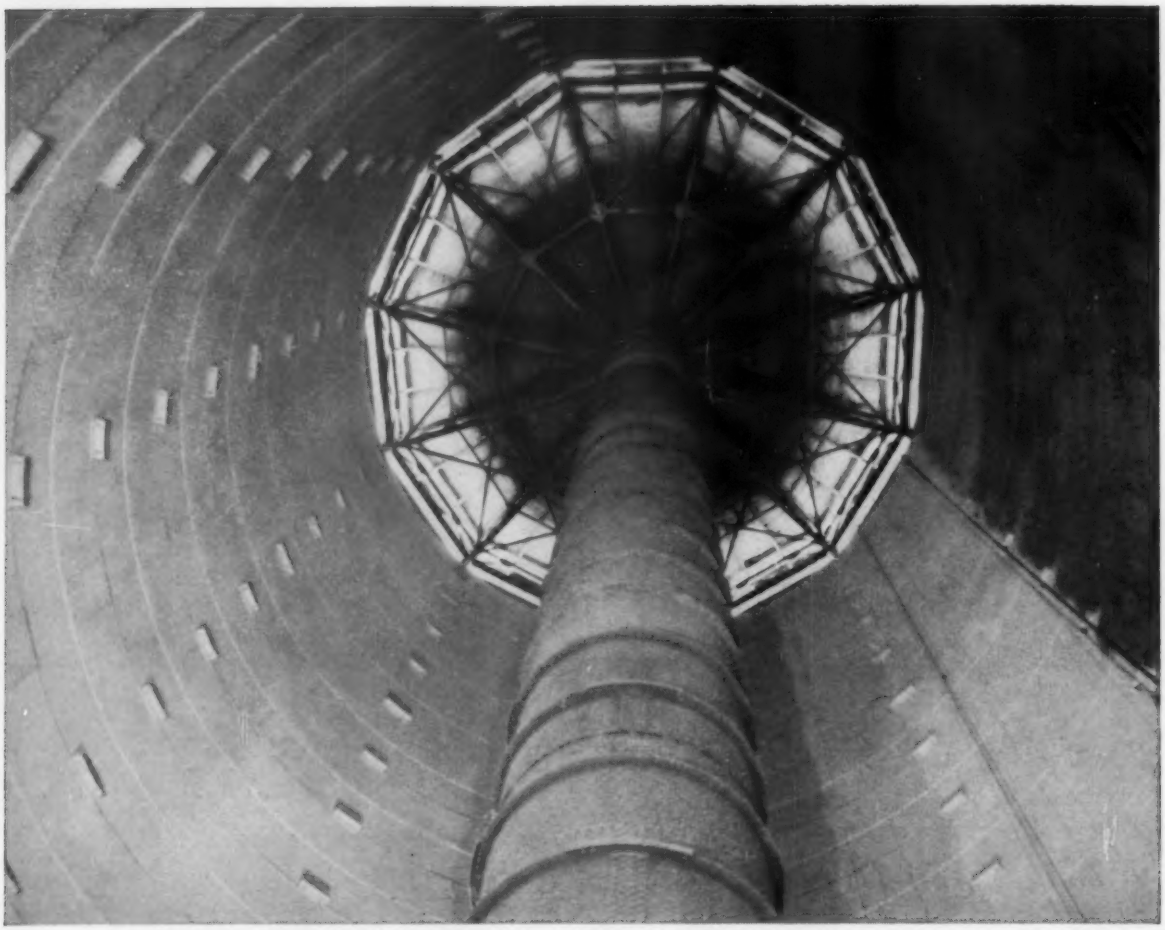


Special zinc-rich coating made by The Debevoise Company of Brooklyn protects interior of surge tank and equalizing pipe by sacrificial action. Vehicle is only a small portion of final coating, thus the extra durability of Parlon fortification is extremely important.

WATER, WATER EVERYWHERE BUT NOT A SPECK OF RUST

. . . because it's protected with Parlon®

Few maintenance men face a greater challenge than those responsible for hydroelectric plants. Varying water levels and high turbulence mean constant trouble from wet atmospheric exposures and dissolved oxygen. Surge tank and penstocks, butterfly valves and piping all are exposed to corrosive attack.

That's why, in this installation, a special zinc-rich paint was chosen. And, even more important, the vehicle used as a binder is fortified with major amounts of Parlon chlorinated rubber. With its hardness, durability and resistance to corrosion, Parlon is ideally suited for such special metal paint formulations.

In fact, wherever metal, wood or concrete must withstand the corrosive attacks of water, acid or alkali, Parlon-based finishes are providing longer service at lower long-term cost. We'll be glad to tell you how a Parlon formulation can solve your specific maintenance problem. Just write for details.

Cellulose Products Department

HERCULES POWDER COMPANY

INCORPORATED

966 Market Street, Wilmington 99, Delaware

CR57-2

For more facts circle 600 on Reply Card

About the Cost of Living . . . with Steam Traps

WHEN YOU specify steam traps, what could possibly be more important than *the cost of living with them* — production cost . . . steam cost . . . downtime cost . . . repair cost.

No steam traps manufactured have ever provided greater equipment operating efficiency or lower trap maintenance cost than Armstrongs.

Consider the experiences of these companies:

"30% Greater Output from platen presses since installing Armstrong Traps" — rubber processor.

"$8000 Annual Fuel Saving since replacing 600 traps with Armstrong" — metal processor.

"30% Less Downtime for repairs with Armstrong Traps" — food processor.

"$25,000 Trap Maintenance Saving every year since installing 4000 Armstrong Traps" — major chemical plant.

You may well ask, "Can there really be so big a difference in steam trap performance?" The answer is: These are typical experiences of people who have compared Armstrong trap performance — not for a month or a year, but over periods of 2, 5 and even 10 years or more.

The Armstrong trap has certain fundamental advantages, including:

No Steam Loss — the valve is always water-sealed.

Large air-venting capacity — air is automatically discharged along with condensate.

Long-life parts — hardened chrome steel valve and seat — all other parts corrosion-resistant stainless. Absolutely nothing to stick, bind, clog or collapse. Not affected by ordinary dirt and scale.

Unconditionally guaranteed to satisfy. It takes an awfully good product to carry such a guarantee.

Steam traps can have such a big effect on plant operating efficiency, they are worth more than casual consideration. Let your Armstrong Factory Representative answer your questions. There is no obligation. Call him or write:

ARMSTRONG MACHINE WORKS
9125 Maple Street • Three Rivers, Mich.

Do you have "The Steam Trap Book"? —44 pages of useful data on trap sizing, calculation of condensate loads, installation and maintenance. Free on request.

ARMSTRONG STEAM TRAPS

For more facts circle 601 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 263-264.

1—CLEANING UNIT washes both work and tote pans

This automatic work and tote pan cleaning machine is claimed to save 50 per cent on floor space, prevent mixing of work, and reduce manual handling. Manufacturer says it is adaptable for any parts handled in tote pans, boxes and similar containers. It receives tote pans of work, dumps the work into a drum type washing section, then carries the upside down tote pan through an integral conveyor type washing section above the drum section where work is processed. Both work and tote pans are washed, rinsed, and dried. The tote pans return to the discharge end of the machine ahead of the parts they formerly contained. Then the clean, dry batch of work is loaded, automatically, into the same clean and dry tote pans. Ransohoff, Inc.

2—STORAGE METHOD makes best use of space

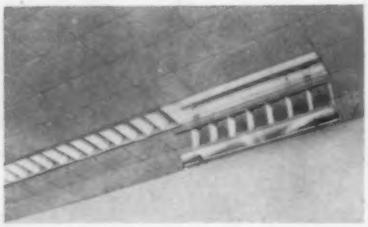
Burlington Way Drive-In Racks are designed to facilitate handling of large volumes of material. Utilizing available overhead space and eliminating access aisles with the "drive-in" feature, these racks

effect worthwhile savings in floor space. They are claimed ideal for fragile or irregular items too—from light bulbs, bagged goods or produce to industrial objects. The racks eliminate breakage and crushing, says manufacturer, and they permit circulation of conditioned air in freezer rooms.

Principle of operation is that of a multiple row rack which permits penetration by the lift truck to the full depth of the rack, where the loaded pallet is set down, with others following it until the desired multiple of pallets is established. Depth of pallets is determined by size of item inventory, character of material stored, and lift equipment to be utilized in handling. Burlington Fabricators, Inc.

3—ONE-LAMP TROFFER for high level lighting

This one-lamp troffer has been developed to provide low-bright comfort in a high-level flourescent lighting unit. The troffer has anodized aluminum parabolic reflecting surfaces. Light is directed at the work, not at the eyes, company states. Mounted individually or in rows, the



troffer allows no break in its line of light, as there are no interruptions or end-of-fixture cross members.

It is pointed out, also, that installation costs are minimized with this troffer because there are no supporting yokes to install. The troffer housing is positioned on ceiling supporting members by hanging devices which are furnished attached to the fixture. Wiring is claimed fast and easy. The troffer housing encloses ballast and wiring accessories, including lampholders, and forms a wireway for continuous mounting. It provides shielding of 45 deg by 45 deg. Smithcraft Lighting.

4—CUTTING OIL clings to metal at any angle

DCS Pressurized Cutting Oil is a reinforced, heavy bodied emulsion formulated from chlorinated base sulphurized oils which do not run off the work, it is announced. Spray method of application puts spot of oil where needed—can be directed to hard-to-lubricate areas such as inside threading of pipe. The cutting oil is reported efficient for drilling, cutting, sawing, threading, tapping, etc. of soft metals like aluminum and brass or the hardest stainless steels. It is furnished in pressurized spray container. A. W. Chesterton Co.

5—SPRAY HEATERS with temperature, viscosity control

Viscomatic Hot Spray Heaters in which temperature and viscosity control are effected by the setting of an external dial are announced. According to manufacturer, the "Dial-a-Matic" feature permits required temperature and viscosity control settings to be dialed even while the unit is operating. Formerly special formulations were often required for use with hot spray. Now, these heaters are adjusted to material being used, it is pointed out; it's not necessary that materials be reformulated. The Dial-a-Matic feature is designed to provide finger-tip control of temperatures between 90 and 180 F.

Standard paint materials, including lacquers, enamels, vinyls, epons and oil base paints can be handled with the heaters, as well as specially formulated hot spray materials, it is stated. They incorporate a sensitive fluid temperature controller, thermometer, and fluid passage-way through which paint is circulated for temperature control. The Spee-Flo Co.

6—HOPPER, self dumping, for use in narrow aisles

This self-dumping hopper, only 30 in. wide, is for handling bulk materials, scrap and waste through narrow aisles and in confined areas. The hopper will pass through ordinary doors; and has a capacity of 10 cu ft. Mounted on three casters, the hopper can be pushed manu-

ally or transported by fork truck. The single rear caster is swiveled to permit sharp turns around tight corners. Malleable iron and rubber tire casters are available. Pockets built into the frame permit entry of handling truck forks.

The self-dumping action is triggered when operator releases a locking handle on the rear of the hopper. It rolls forward to dump its contents, then returns to an upright position and automatically locks itself in place. It can also be dumped while carried by a fork truck or while on the ground. Constructed of heavy steel plate, the hopper weighs 450 lb, is 49 in. long and 40 in. high. Standard width is 30 in., but the hopper can be had narrower. Roura Iron Works, Inc.

7—AIR COMPRESSOR in the 350 to 1000 hp range

The WN-224 is the largest package-type compressor available, according to manufacturer's report. Output at 80-125 psig is rated from 2418 to 6048 cfm, depending on motor horsepower. The compressor is a four-cylinder, double-acting, water-cooled machine of semi-radial design, achieving final pressure in two stages. Three standard single models and three "twin unit" models are available, plus corresponding altitude sizes. Twin units consist of two standard compressors powered by one motor. High and low pressure variations are also available. Drive may be by electric motor, flange mounted

Crane Valves Handle Corrosive Fluids Without Costly Leakage

Valve life more than doubled in this corrosive brine service

After more than 10 years' service on strong brine, these valves are still operating with high efficiency.

They are Crane No. 461 iron body gates, installed on a brine and condensate line at the world's largest sea water salt plant—located in Newark, Calif., and owned by Leslie Salt Co.

Before changing to the Crane valves, the plant was having difficulties with lubricated plug cocks. The plugs pitted; the cocks leaked continually, and had to be replaced within 5 years. Installing Crane iron gate valves put a stop to the problem, eliminating leakage and replacement costs.

For more information on Crane iron body valves for many corrosive services, see your local Crane Representative, or write to Crane Co., address below.

GET YOUR COPY of "Valve Performance Facts"—32 illustrated case histories covering valve installations throughout industry.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill., Branches and Wholesalers Serving All Areas

For more facts circle 602 on Reply Card

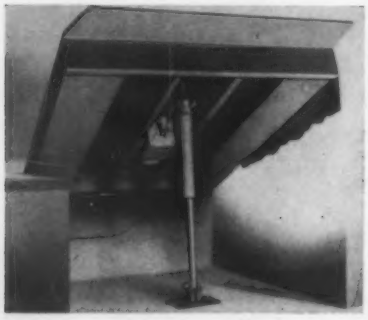
NEW PRODUCTS

(Begins on page 186)

or coupled, or by diesel engine, steam turbine or turbo-electric combinations. The compressor measures 9 ft 8 in. high by 12 ft 8 in. wide. Length ranges from 8 ft 7 in. to 14 ft 2 in. Twin units are from 20 ft 11 in. to 21 ft 11 in. in length. Joy Mfg. Co.

8—DOCK RAMPS are easily installed units

Trans-O-Matic Ramps are available for electric power or air-oil operation. Platform size of all models is 6 ft by 8 ft 4 in., including a fixed or hinged throw-over lip which rests and "rides" with truck or trailer bed while the vehicle is



being loaded. The ramp platform is ⅛ in. checkered steel plate, reinforced by box-section members, giving the unit a cross-over or roll-over capacity of 20,000 lb. Rising and lowering action of the ramp is powered by a hydraulic cylinder. An automatic locking device is provided to hold the platform in a fixed position if the truck should move out from under the lip. No ground excavation is required for the hydraulic cylinders, it is noted, and units may be installed in existing or new docks. Globe Hoist Co.

10—TRAILER UNIT can haul the bulky freight

Neither hand nor crane loading is needed with the Straddle Trailer, it is noted. The self-loading unit is backed over the load to be carried. Then the load is hooked to a series of cables and hoisted inside the trailer. At the delivery point the load is simply lowered to the ground and the trailer driven away. The Straddle Trailer is 35 ft long, 12½ ft high and 8 ft wide. Loads up to 20 tons can be carried at highway speeds, it is announced, and the unit can be pulled by any standard tractor.

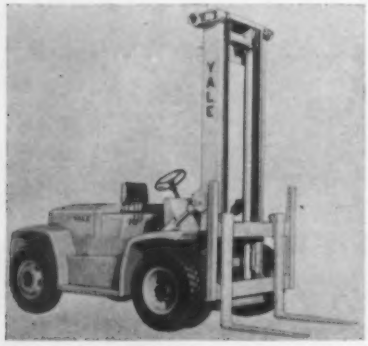
Among applications expected for the Straddle Trailer are the loading and unloading of lumber, pipe, heavy machinery, pre-stressed concrete assemblies and large pre-fabricated units. Power for the lifting and lowering is taken from a winch on the tractor, says manufacturer; a power plant on trailer isn't needed. Unit is built on order. The Mighty Mover Co.

11—FORK TRUCKS have extra maneuverability

Shorter turning radius and other extra maneuverability may be gained in applications where operating conditions are not too severe, with the FTA Series of electric fork trucks. Two models are available: FTA-50, with 5000 lb capacity, and FTA-70, with 7000 lb capacity. The trucks are suggested for normal and light-duty applications. According to manufacturer these trucks are capable of handling capacity loads under normal operating conditions on such applications, and they can turn in a shorter radius and operate in narrower aisles than heavy-duty trucks of the same capacity. Specifications of the FTA-50 include a 77¾ in. turning radius, 41-in. overall width and 79⅝ in. length without forks. It has maximum travel speed of 5.5 mph. The FTA-70 is slightly larger, and has a speed of 5 mph. Standard lift height of both is 120 in. Baker-Raulang Co.

9—GAS POWERED TRUCK stresses visibility, stability

Outstanding among many new features announced for the G-3 line of gasoline powered lift trucks is channel construction, claimed to provide 300 per cent more visibility for the operator. Also reported are load stability not previously obtained in this capacity industrial lift truck



equipment, and the fastest possible cyclic rate of operation within limits of safety. The line is being introduced in 15,000-, 16,500, 18,000- and 20,000-lb capacity, pneumatic-tired models powered with gasoline or LP gas and utilizing either a straight, friction clutch transmission or fluid coupling transmission.

Contributing to the increase in visibility is the use of two widely spaced lift cylinders and nested channels. Chains for transmitting lifting power to the carriage are in front of the lift cylinders, freeing from obstruction the space between lifting members. It is noted that the rugged channel design requires only cross members at each end, leaving a maximum lateral opening for the operator to see through. The carriage has only a top and bottom cross bar. Forks extend 12 in. below bottom carriage bar. The operator sits high in the center of the truck, a position which also affords good visibility to rear. The Yale & Towne Mfg. Co.

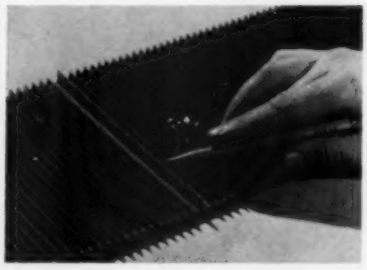
Noteworthy developments in materials handling equipment are presented on this page—and throughout the entire New Products department. Use the Reader Service Cards to get more information.

12—DOCKBOARD facilitates loading of trucks

The Truck-O-Matic incorporates a new design which lets the dock be lowered from its up position automatically when the incoming truck pushes or eases against the actuators or operating arms. Motion of the Truck-O-Matic is accomplished by and due to the actuators that disturb the equality of moments or balance of the ramp and the single counterweight. This fulcrum-like feature creates a movement of the ramp and a positioning of the ramp that makes it heavier than the counterweight. It also permits variable vertical travel of the ramp for a given travel of the actuators. Thus, it is noted, any truck can be serviced regardless of height. All movement is accomplished with the one counterweight. Karl A. Herman Co.

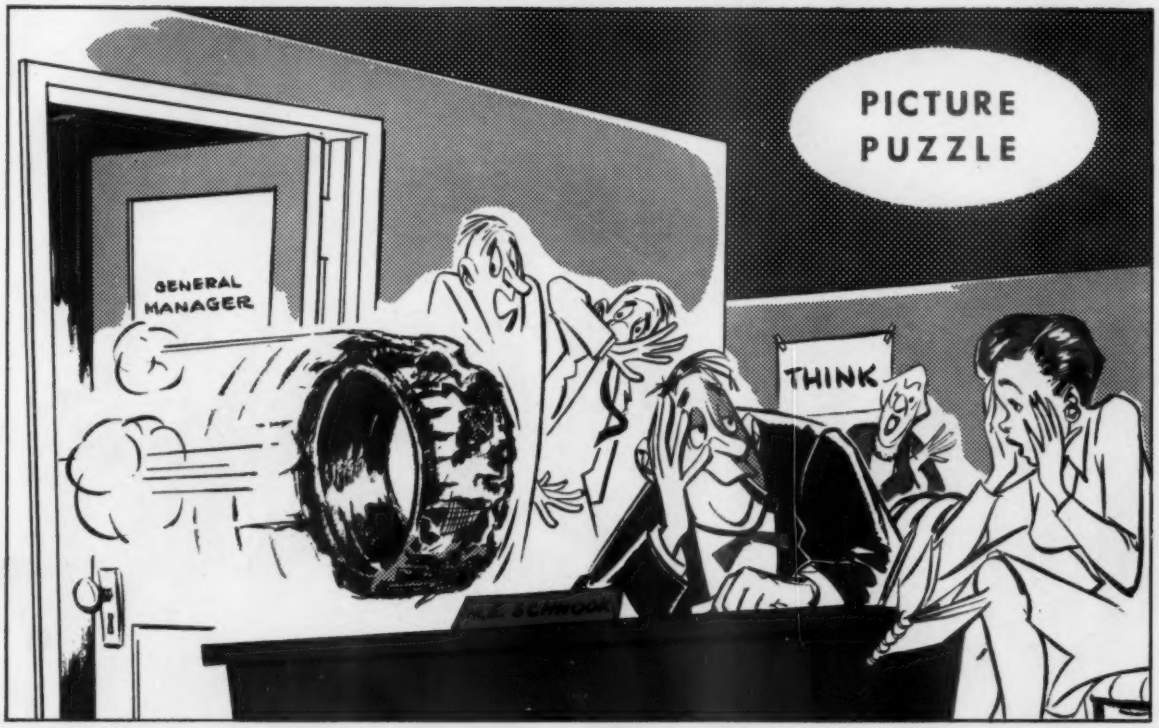
13—CONVEYOR BELT carries light and heavy packages

Griptite is a ribbed conveyor belt that will carry lightweight packages as firmly as it carries heavy cartons, manufacturer announces. The belt is especially designed for steep-angle conveyor operations. Packages are held in place by a series of inverted V-shaped ribs that grip the cartons in either incline or decline operations. Protection for holding lightweight packages in place is provided by raised ribs or cleats (also inverted V-shaped) spaced 18 in. apart. Standard ribs are



¼ in. high, spaced four to the inch. The raised ribs, which also help move packages onto the belt, are ⅜ in. high. The ribs are molded of tough, flexible rubber; the carcass is a lightweight fabric designed to provide a thin, flexible construction suited for the small pulleys normally used on package conveyors. The incline angle of the belt depends on packages carried and type of equipment used, it is noted, and under certain conditions the belt may be operated at a 45-deg angle. B. F. Goodrich Industrial Products Co.

(Continued on page 198)



GUESS WHO DIDN'T SPECIFY MONARCH INDUSTRIAL SOLID TIRES

Schnook, I told you to reduce our replacement tire costs! That "memo" I sent you lasted only 60 days!

But . . . Chief! I tried! We made an analysis and ordered our lift truck drivers to slow down!

Analysis? Slow down? Why didn't you save valuable time and specify MONARCH tires!

Monarch? What's so special about them?

You amaze me, Schnook! Don't you know MONARCH is the only industrial tire manufacturer specializing in solids? That their development-engineering and production facilities concentrate on producing the best solids on the market?

If they're that good they must cost more! How can I save by paying a premium for solids?

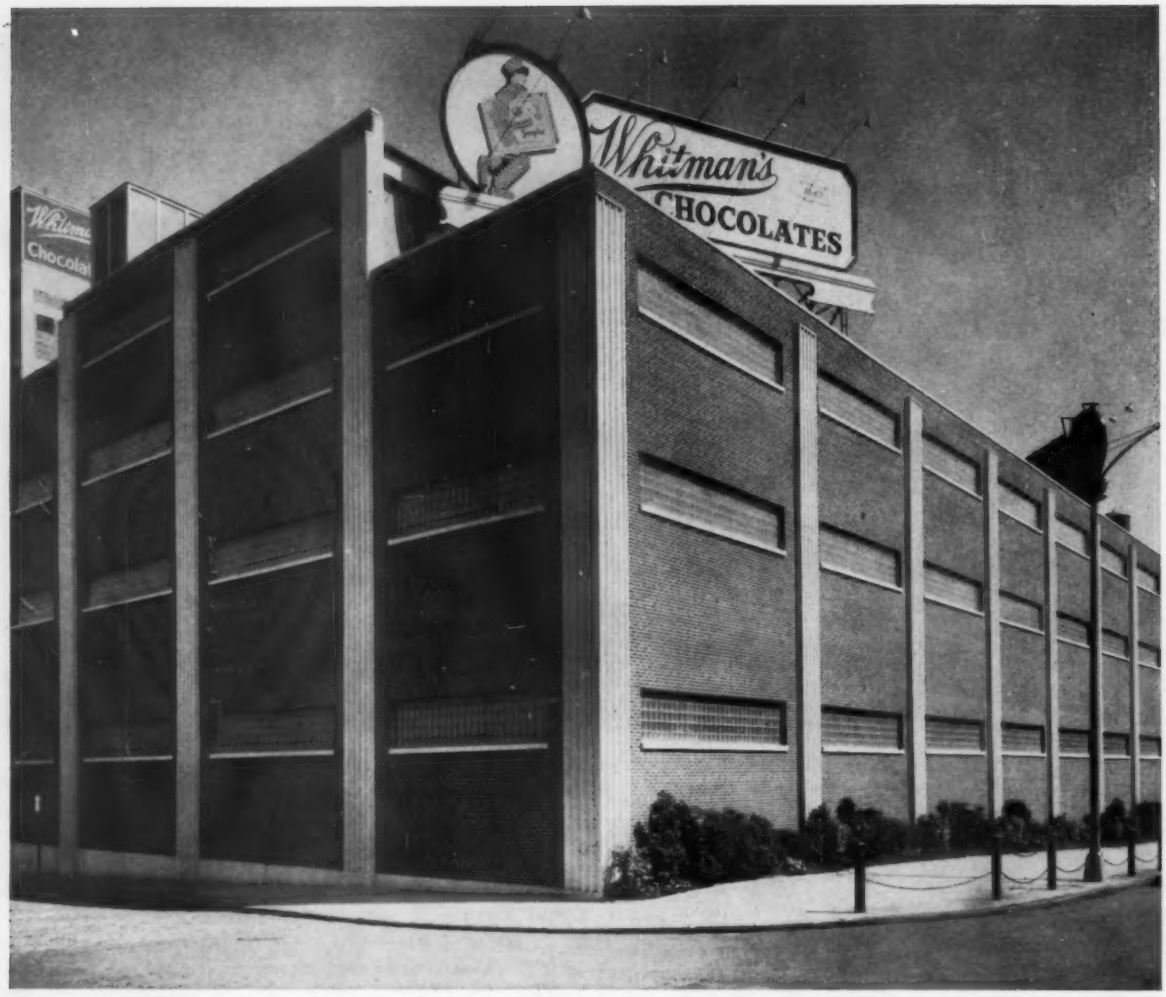
Wrong again, Schnook! MONARCH tires cost no more than other brands. They last longer because they're made from premium quality materials.

You win, Chief! I'll call the local Monarch dealer today for prices.

Why don't you check the Yellow Pages for your nearest Monarch dealer! Ask him, or write direct, for BULLETIN TD-200. it contains factual proof that Monarch tires wear better . . . last longer.

THE MONARCH RUBBER COMPANY
453 Lincoln Park, Hartville, Ohio

For more facts circle 603 on Reply Card



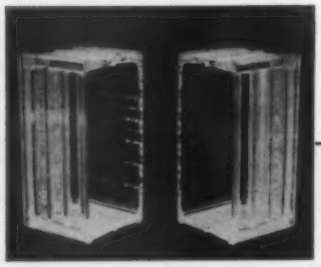
Insulation value of PC Glass Blocks helps solve Whitman's temperature control problems

Ten years ago, when Stephen F. Whitman and Son, Inc., famous candy manufacturer, built this packaging plant in Philadelphia, they decided to use PC Glass Block panels instead of ordinary windows. Two important benefits of glass block panels prompted their decision—high insulation value and air-tight construction.

Since installation, the panels have successfully contributed to the strict temperature control so vital to candy packaging. Because the panels have high insulating efficiency, and completely eliminate drafts and air leaks, temperature fluctuations that used to cause discoloration and fingerprinting of chocolate coatings have been prevented.

The Company reports additional advantages, too. The glass block panels bring soft daylight into the working area. Window maintenance is no longer a costly problem. And the clean, neat panels contribute to an attractive exterior that has kept its "just-built" look.

For details on PC Glass Block benefits, write, or see us in Sweet's. Pittsburgh Corning Corporation, Dept. PG-57, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor St. W., Toronto, Ontario.



Cut-away view shows reasons for high insulation efficiency of PC Glass Blocks. Hollow, sealed-glass construction holds dried air at a partial vacuum. This "dead air" space gives glass blocks insulation value of an 8" thick masonry wall.

PC Glass Blocks

PITTSBURGH PC CORNING ®

Also manufacturers of FOAMGLAS® insulation

For more facts circle 604 on Reply Card

The temperature of this Wissco Rod Reinforced Belt varies from 2,050° F. to room temperature as it conveys steel fittings through a brazing furnace and into a water-cooled chamber.

WISSCO BELTS *and the Mossberg Pressed Steel Corporation*

The story of Wissco Belts is best told by their users. For instance, Mr. Robert B. Housman, design engineer for Mossberg Pressed Steel Corporation, Attleboro, Mass., reports:

"We obtained over a 100% increase in belt life—simply by switching to Wissco Belts."

And Mr. Housman goes still further: "What's more, the change to Wissco Belts enabled us to reduce belt maintenance costs by 15% and to spend 20% less time cutting slack out of our belts. We know of no other belt that can do a better job of withstanding the constant heating and cooling cycle of the brazing furnace and still maintain its inherent strength and consistency."

This Wissco Belt conveys steel fittings for braiding machines through the brazing furnace and into a water-cooled chamber. Normal belt operation is for an 8-hour, 5-day week; however, the furnace is put on a 16-hour day during peak months. This puts an additional strain on the metal belt since the 2,050° F. furnace temperature must be maintained around the clock under these conditions.

If yours is a high temperature operation . . . or any processing or conveying job . . . it'll pay you to get the complete Wissco Belt story. Contact our nearest sales office today.

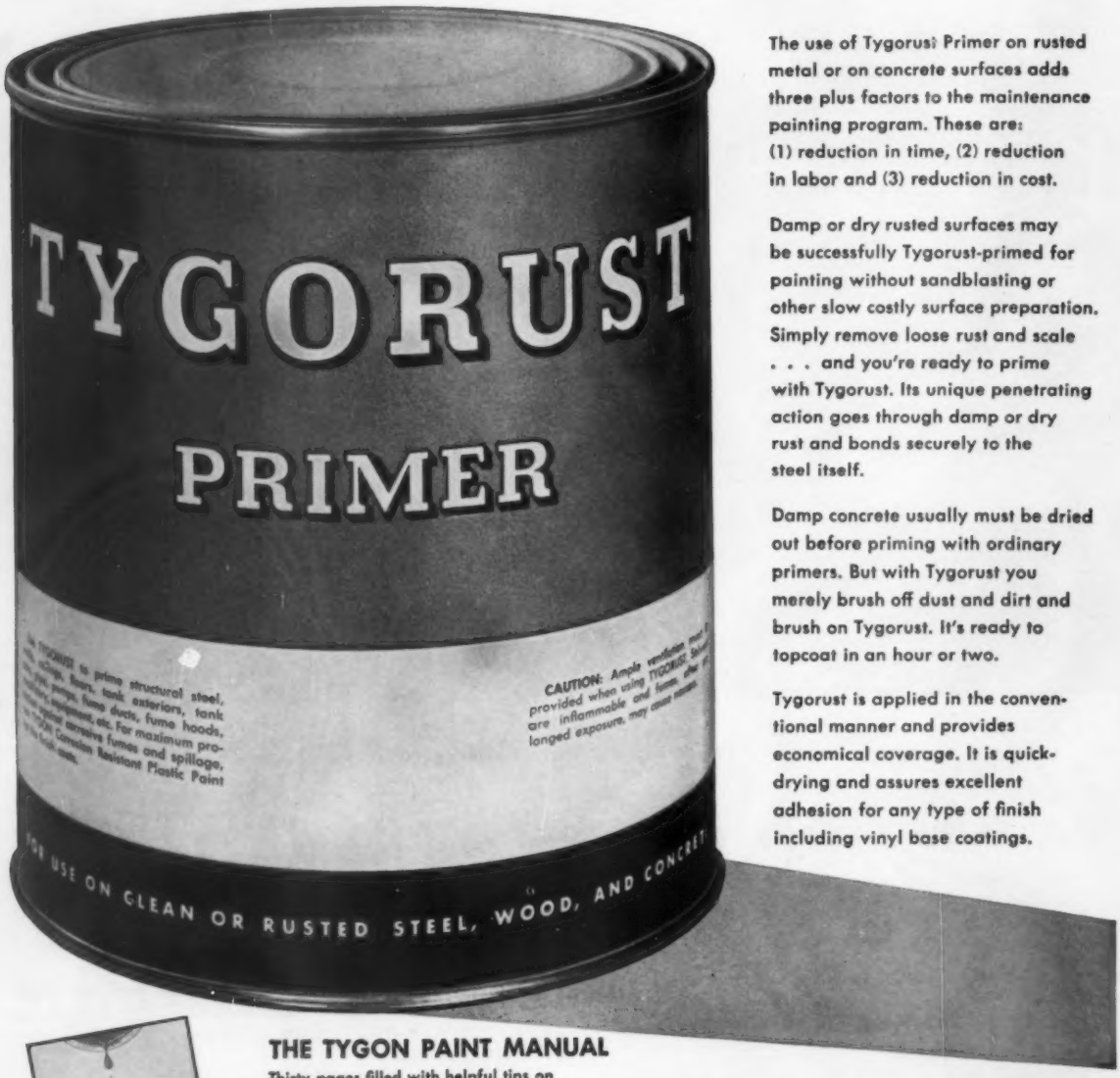
THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit
New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Montreal • Toronto

CF&I **WISSCO BELTS**
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

4633

For more facts circle 605 on Reply Card

CUT HOURS AND DOLLARS FROM MAINTENANCE PAINTING



The use of Tygorust Primer on rusted metal or on concrete surfaces adds three plus factors to the maintenance painting program. These are: (1) reduction in time, (2) reduction in labor and (3) reduction in cost.

Damp or dry rusted surfaces may be successfully Tygorust-primed for painting without sandblasting or other slow costly surface preparation. Simply remove loose rust and scale . . . and you're ready to prime with Tygorust. Its unique penetrating action goes through damp or dry rust and bonds securely to the steel itself.

Damp concrete usually must be dried out before priming with ordinary primers. But with Tygorust you merely brush off dust and dirt and brush on Tygorust. It's ready to topcoat in an hour or two.

Tygorust is applied in the conventional manner and provides economical coverage. It is quick-drying and assures excellent adhesion for any type of finish including vinyl base coatings.

THE TYGON PAINT MANUAL

Thirty pages filled with helpful tips on maintenance painting; from surface preparation to Adjustment, Care and Cleaning of Equipment. Send for your free copy today.

431-E

PLASTICS AND SYNTHETICS DIVISION

U. S. STONEWARE
AKRON 9, OHIO

For more facts circle 606 on Reply Card

Magnificent

any way you look at it!

Modine Gas Unit Heaters are years ahead in styling

Yes, the Magnificent Modine offers everything you could hope to find in a gas unit heater—superb styling, sturdy construction, unbeatable performance.

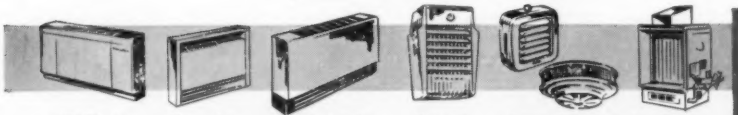
Advanced-design features such as stainless steel burners and stainless or aluminized steel heat exchangers and direct-fired tubes assure quick heat . . . long-lasting, economical service. And Modines are up to 50% lighter . . . cost less to ship and install.

Eight sizes are available from 25,000 to 310,000 Btu, the largest model often replacing two smaller units with consequent savings. For natural, mixed, LP and LP-air gas mixtures.

- **FAST, UNIFORM HEAT** — Direct firing of each heat exchanger tube assures quick, uniform heat distribution.
- **TROUBLE-FREE OPERATION** — Large, knife-sharp stainless steel ports resist lodging of dirt and scale.
- **IMPROVED COMBUSTION** — Hooded combustion air inlets directly below each burner improve efficiency . . . minimize flame disturbance.

Complete details are contained in Bulletin 656-A. Get your copy by calling the Modine representative listed in your classified phone book or write Modine Mfg. Co., 1563 De-Koven Ave., Racine, Wis.

GU-1344



AIRditioners | Convectors | Cabinet units | Gas unit heaters | Steam & hot water unit heaters | Duct furnaces

In Canada: Sarco, Ltd., Toronto

Modine
MANUFACTURING COMPANY

For more facts circle 607 on Reply Card

For more facts circle 608 on Reply Card ⟶

New Westinghouse Life-Line H with silicone insulation

10 TIMES LONGER INSULATION THAN ANY OTHER STANDARD

Production Increases with Life-Line® "H" because you get top performance – reduced maintenance and down time. Here's how:

High-Temperature Silicone Insulation combined with the full complement of iron and copper for low-temperature standards – 60°C rise. Life-Line "H" insulation will last 10 times longer than ordinary Class B under all temperature conditions.

Controlled Ventilation – a new concept in motor cooling and cleaning – gives more capacity, longer life, and protection against damaging brush dust.

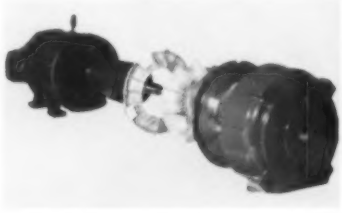
Fastest Response of any industrial d-c motor on the market – armature inertia reduced up to 55% – commutating ability increased 35%. You get closer regulation, faster accelerations, quicker reversals.

Greatest Protection of any industrial d-c motor through new housing design. In most cases, eliminates need for a splash-proof motor.

It's All New – with longer life, greater dependability, top performance. For all the facts about the Life-Line "H" call your Westinghouse sales engineer. Or, write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-21990

New Silicone-Insulated Life-Line "H" is built and rated to meet low-temperature Class B standards. Insulation is eliminated as a limiting factor on motor life under normal conditions. Even with emergency overloads, Life-Line "H" will go right on working in many cases when ordinary Class B would fail.

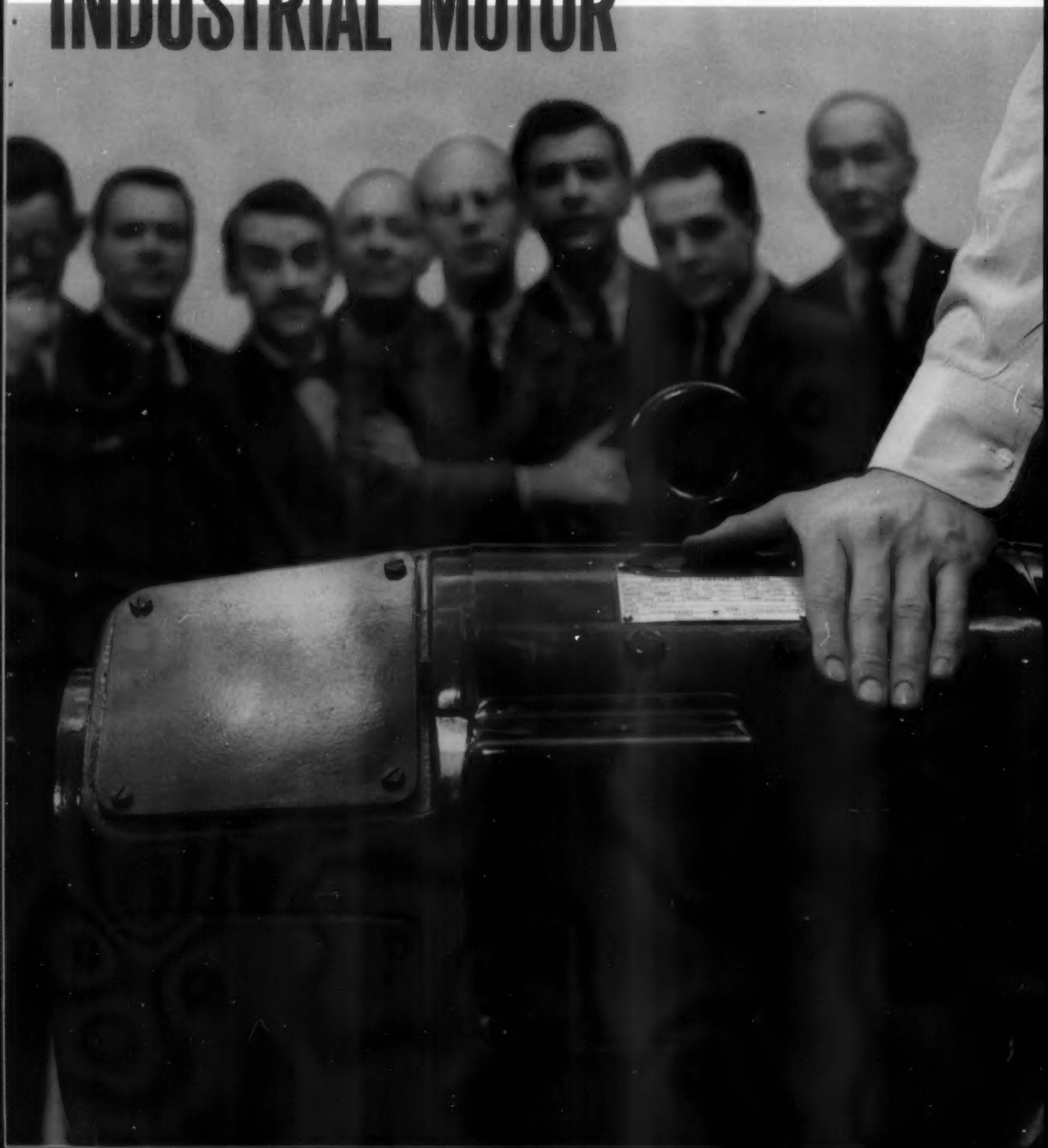


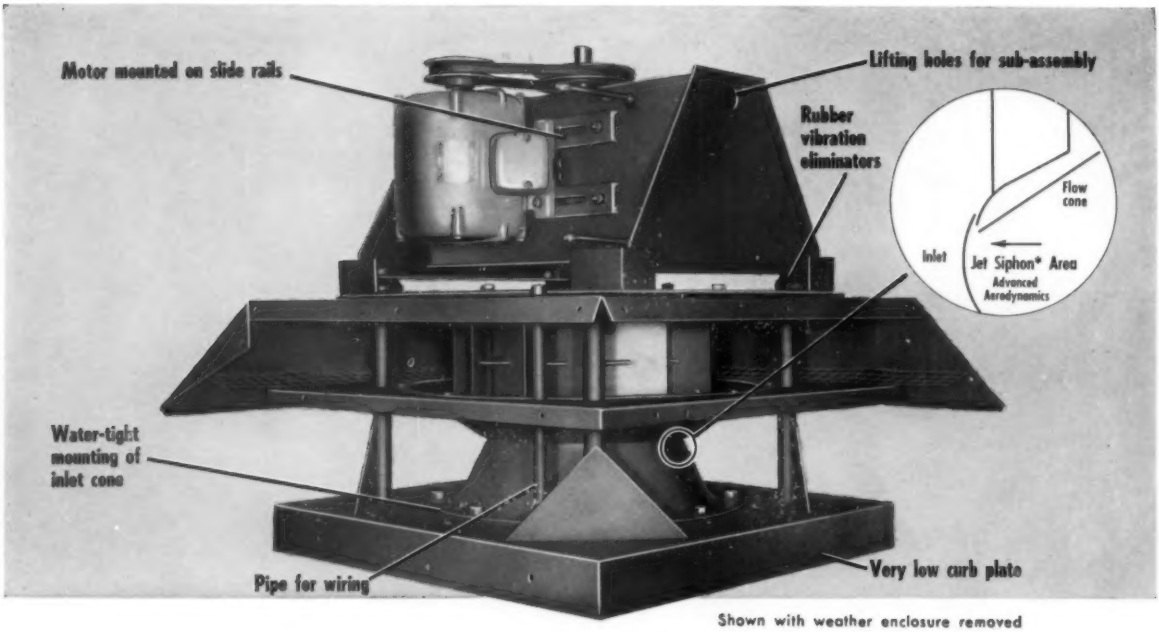
New Controlled Ventilation moves more air, positively distributes it to best advantage, cleans machine parts instead of contaminating them. Result – armature inertia can be reduced for faster response. Life-Line "H" lasts longer, increases production because maintenance and down time are reduced.

New Standard of Protection – All commutator access openings have sealing covers – ventilation openings face down. Dripping or running liquids are excluded. Maintenance and down time are reduced. Need for splash-proof machines eliminated in most cases.

YOU CAN BE SURE...IF IT'S Westinghouse

LIFE...MORE EXTRA-CAPACITY INDUSTRIAL MOTOR





Shown with weather enclosure removed

PLUS VALUES... all yours in the Clarage Centrilator

POWER ROOF VENTILATOR — CENTRIFUGAL TYPE

Jet Siphon* feature for stable, high efficiency.

Static pressures to 2" — thus well suited to both light-duty installations without ductwork and applications where ductwork or hoods impose considerable resistance.

Adaptable to a wide range of motor sizes.

Variable pitch V-belt drive.

Wheel and inlet designed for streamlined air flow.

Built heavy-duty throughout to assure long-lasting, trouble-free service.

Every wheel statically and dynamically balanced on precision machines.

Inspection panel and complete accessibility.

Low overall height.

Venting of motor and drive area.

Engineered and constructed for extra quietness.

Heavy-duty anti-friction bearings.

Simple installation — only 4 bolts required.

Write today for Bulletin 550. Clarage Fan Co., Kalamazoo, Mich.

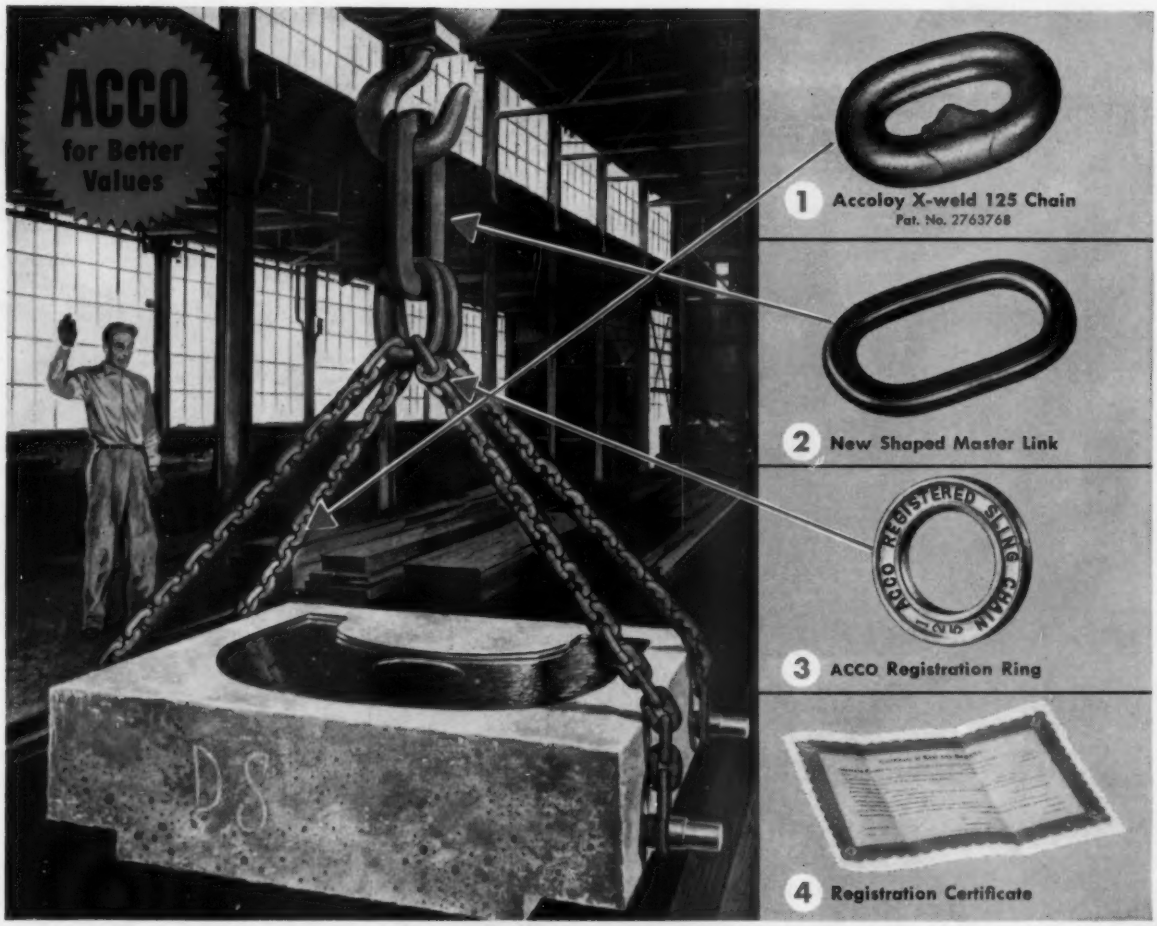
CLARAGE

*Patent applied for

...dependable equipment for making air your servant

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 609 on Reply Card



You get all these "plus values" in Acco Registered® Sling Chains

• When you equip your plant with ACCO *Registered* Sling Chains, you are getting slings of such *proved safety and efficiency* that they are the standard by which all other slings are judged! And, in addition, you get all these important, exclusive "plus values":

1 Accoloy X-weld 125 Chain • Where extra strength is desired in an ACCO *Registered* Sling Chain, the patented new Accoloy X-weld 125 Chain is used. Its king-sized welded area and non-kinking feature assure greater ruggedness and better service at no increase in price.

2 New Shaped Master Link • ACCO engineers have created the new Shaped Master Link which, without any increase in weight, holds its form under loads up to 18% greater than a standard round section can. This means extra security for your loads.

3 ACCO Registration Ring • The presence of this serially-numbered ring on an ACCO *Registered* Sling Chain shows that each component has been tested before assembly . . . that the assembled sling has been proof-tested to twice its working load limit . . . and that all tests have been successfully passed before registration of the complete sling and shipment from the factory.

4 ACCO Registration Certificate Every buyer of an ACCO *Registered* Sling Chain is furnished with a Registration Certificate signed by American Chain & Cable Company, Inc. This Certificate gives assurance that the sling meets ACCO's severe requirements of quality and proof-tested performance, and that it has been individually registered on ACCO's permanent records.

Tops in safety and strength

ACCO *Registered* Slings, with *Magnaflux-tested hooks*, give the best in strength, safety, service—and long-range economy. They are available through ACCO *Registered* Sling Chain Distributors in principal industrial centers. For full data, write us at York, Pa.

WHAT "ACCO REGISTERED" MEANS

1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling

American Chain Division

AMERICAN CHAIN & CABLE

ACCO

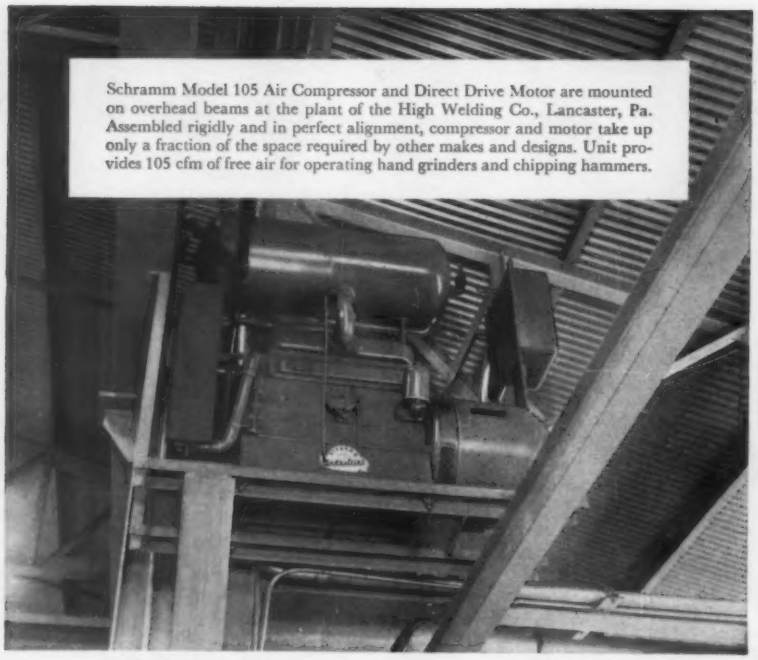
Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, *New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

*Indicates Warehouse Stocks

TRADE MARK

For more facts circle 610 on Reply Card



Schramm Model 105 Air Compressor and Direct Drive Motor are mounted on overhead beams at the plant of the High Welding Co., Lancaster, Pa. Assembled rigidly and in perfect alignment, compressor and motor take up only a fraction of the space required by other makes and designs. Unit provides 105 cfm of free air for operating hand grinders and chipping hammers.

WELDING COMPANY DISCOVERS:

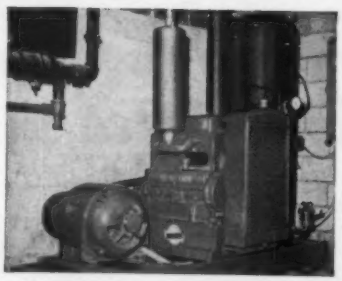
Schramm Compressor saves floor space . . . needs no foundation at all

High Welding Co., Lancaster, Pa., saves floor space by perching its Schramm 105 Air Compressor on overhead beams. That's easy because Schramm Industrial Compressors are vibration-free—need no special foundations. And no compressor is more compact.

Besides saving space, Schramm Compressors offer features found in no other machine. Schramm units of all sizes produce full rated capacity at the tool. Balanced reciprocating parts eliminate vibration and cut down wear on bearings. And Schramm engineered cooling systems permit continuous operation without danger of over-heating.

Schramm manufactures a complete line of air compressors and accessories for all industrial uses. Catalog GC-55 describes our Small Industrial Air Compressors, Catalog 5510 our Industrial Air Compressors. Write today for your free copies—without obligation.

Your local Schramm Dealer is listed in the Yellow Pages of your telephone directory.



Jacketed Liquid Cooling System. Units delivering 85 cfm of air and over are jacketed for liquid cooling. Units delivering 50 cfm of air or less are equipped with air blast. Both provide adequate cooling for full load, permitting continuous operation.

No Foundation Needed. Balanced reciprocating parts in Schramm industrial compressors assure vibrationless operation and permit installation without expensive foundations. Schramm units can be set up in almost any out-of-the-way location.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. West Chester, Pa.

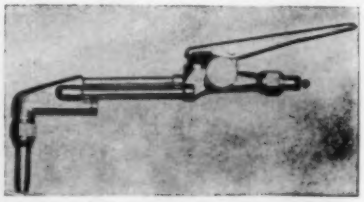
For more facts circle 611 on Reply Card

NEW PRODUCTS

(Begins on page 186)

14—ATTACHMENT for cutting with welding torch

Style 1490 is a light duty oxyacetylene cutting attachment which attaches to company's lightweight welding torch, Style 400. The weight of the attachment is



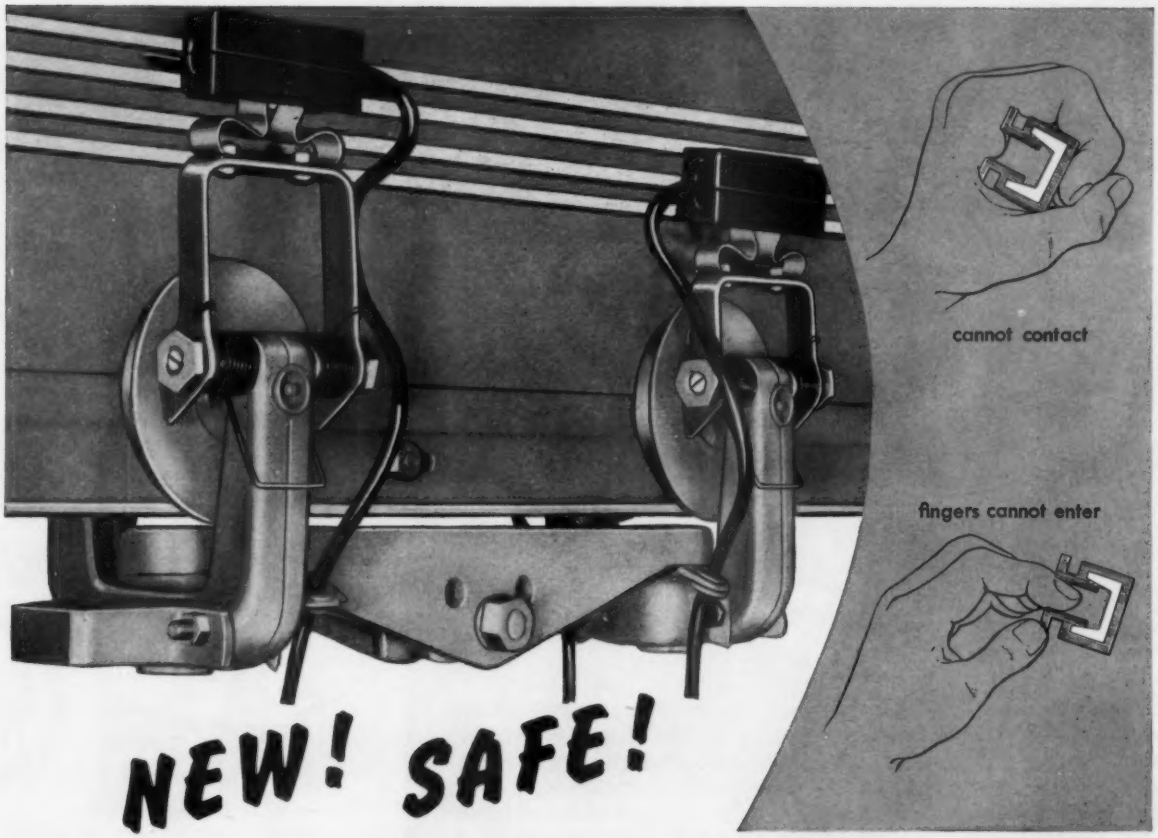
13 oz, and it measures 9½ in. in length. Cutting range is up to 1 in. thick steel. According to company, a firm gas-tight seal is assured with tapered gas sealing rings, and tightening makes a firm joint. A diaphragm-type cutting oxygen valve is utilized to eliminate need for valve packing and prevent gas leakage. The cutting attachment has head and body brass forgings and a removable mixer for easy cleaning. Air Reduction Sales Co., Div. of Air Reduction Co., Inc.

15—GAS FORK TRUCK has 4000-lb capacity

Gasoline powered, the Model 430-G Fork Truck features maintenance and operation accessibility, it is announced, and incorporates many features of company's line of electric fork trucks. The 4000-lb capacity truck has an easily replaceable clutch; removable seat and side-plates, and hinged hood to permit access to engine parts; and easy access to the operator's seat from either side of the truck. Control valves are designed to provide precise control of hoist and tilting operations and are conveniently located. The hydraulic control mechanism is exposed for servicing after removal of three screws from cover plate. All instruments are installed face up. The drive axle has top and bottom inspection covers. Quick tire replacement is provided with demountable wheel rim and tire assemblies. The Model 430-G can be equipped for LP gas operation and an automatic type transmission will be available as optional. The Mercury Mfg. Co.

16—CIRCUIT BOARDS can stand heat and humidity

Metallized glass printed circuit boards for high temperature applications under high humidity conditions are announced. Of Fotoceram, strongest of company's photo-sensitive glasses, the boards are designed to withstand a continuous operating temperature of 500 C and to offer excellent electrical resistivity. Because Fotoceram has an etching ratio 15 times higher than many glasses, this printed circuit board is able to feature extremely



NEW! SAFE!

AMERICAN MONORAIL

KANT SHOCK

SHIELDED ELECTRIFICATION

For Monorail Track and Crane Systems

By covering its standard bus bar electrification with a specially designed polyvinyl chloride extrusion, American MonoRail now furnishes completely safe electrified systems.

This KANT-SHOCK shielding absolutely prevents accidental contact with live bus bars. It is impossible for an adult's finger to enter the shield.

A new type sliding shoe collector provides a floating contact throughout a monorail system regardless of any misalignment due to bent bars or at switch and inter-lock connections.

KANT-SHOCK Electrification positively eliminates all the hazards of open bar conductors—prevents costly accidents—protects employees—reduces insurance rates.

Write for KANT-SHOCK Bulletin KS-1

Member of Materials Handling Institute and Monorail Manufacturers Association

For Power Driven Conveyors, Use Landahl Chainless Conveyors

AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13123 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

For more facts circle 612 on Reply Card

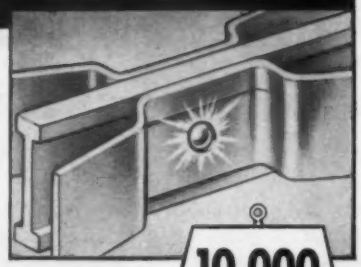
GOLD NUGGET®
WELDED *grating*
PAT. PENDING

Realizing the need for an improved heavy duty, open steel floor grating of greater strength and economy, The GLOBE Company presents GOLD NUGGET Welded Grating — the first grating to take advantage of modern engineering design. As a result of this improved design, the GOLD NUGGET primary load bar provides 22% more strength with 14% less weight. The primary load bar is a miniature I-beam with all of the advantages of a true structural member.

GOLD NUGGET Welded Grating is recommended for power houses, loading docks, oil refineries, fire escapes, drain grates, plating rooms, filtration rooms and for all types of heavy duty platforms.

GOLD NUGGET

- ★ 3/16" projection weld nugget for greater rigidity and strength
- ★ vertical alignment of the main load bars assured
- ★ all bars are load carrying bars including secondary bars
- ★ anti-skid pattern



10,000 POUNDS

PROJECTION WELD

Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

For the complete details of this revolutionary new grating, write for new catalog today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING."

The GLOBE Company
MANUFACTURERS SINCE 1914
PRODUCTS DIVISION

SAFETY GRIP-STRUT GRATING • GOLD NUGGET WELDED GRATING • CABLE-STRUT AND GLOBETRAY CABLE RACEWAYS
4016 SOUTH PRINCETON AVENUE • CHICAGO 9, ILLINOIS
For more facts circle 613 on Reply Card

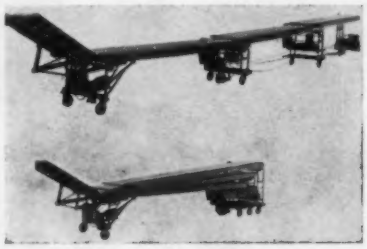
NEW PRODUCTS

(Begins on page 186)

small, close-tolerance holes with close center-to-center distances. The boards may be had in seven thicknesses (after etching) from 0.050 to 0.235 in. Maximum size now available is 12 by 18 in. Corning Glass Works.

17—BELT CONVEYOR offers telescopic feature

Bag-packed materials—sugar, flour, tobacco and similar commodities not conveyed by gravity—are readily handled by this telescopic belt conveyor. Goods can be transported in either direction. In loading trailers and box cars, the telescopic feature lets the conveyor follow the load right into the car. The conveyor comes in 2-, 3- or 4-ft sections.



They come in four lengths from 10 to 16 ft. Belt widths are 10, 20 or 30 in. The belt on each section is driven by a separate motor and the conveyor itself is mobile and telescopes by power drive. Loads up to 300 lb per lineal foot can be handled. Differences in level between dock and trailer are accommodated by pivotal action between sections. An optional accessory is pushbutton-controlled elevating boom, which travels from the floor to 6 ft in height. It may be located at either end. Wilkie Co.

Use the Reader Service Cards provided on pages 263-264 to ask for more information on these products. Circle item numbers of products in which you are interested.

18—PAINT REMOVER loosens many surface coatings

Paint, varnish, lacquer, seal and oxidized oil can be removed from concrete, wood and terrazzo floor surfaces without time-consuming scraping and expensive labor cost with Myco Paint and Varnish Remover, it is announced. It loosens surface coating and holds it in suspension for easy "flush-off" removal with water, company says, leaving surface clean and free of coating residue and dirt. It may also be applied to vertical surfaces such as walls, doors, partitions and woodwork, since it does not run off

For more facts circle 614 on Reply Card →

Complete Power Panelboard Replaced in just 3 hours!

. . . *thanks to* STABREAKER

Suppose a freak accident completely destroys the power distribution panelboard in a plant. Production, of course, stops cold! And every minute that the panelboard remains out of commission, production costs mount higher and higher. It's imperative that the damaged panelboard be replaced as quickly as possible. Here's how the problem can be solved in a fraction of the time ordinarily required.

9 A.M. Electrical Contractor Arrives—Damage is surveyed. Specifications drawn-up for a new panelboard. Old panelboard is removed.

9:30 A.M. STABREAKER Components Purchased from Local Distributor—STABREAKER enclosures and circuit breakers immediately available.

10 A.M. Panelboard Installation Under Way! New STABREAKER enclosure mounted and wired up in about an hour.

11:30 A.M. STABREAKERS Plugged in Place. STABREAKERS are simply plugged-in and wired up . . . the trim fastened . . . and the job is completed.

12 NOON Service Restored! In only 3 hours! And the cost? Far less than that of factory-assembled panelboard installations.

Apply the advantages of STABREAKER to your particular needs. The combination of STABREAKERS and prefabricated STABREAKER panel enclosures provides you with the fastest, most economical method of obtaining the most flexible system of lighting and power distribution panelboard ever devised!

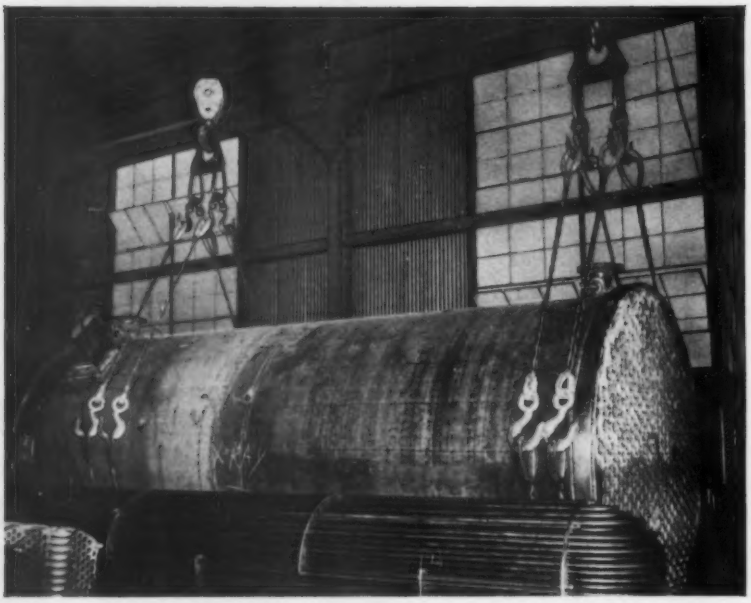
Finest Products Engineered

FEDERAL PACIFIC ELECTRIC

COMPANY

Main Office: 50 Paris Street, Newark 1, N. J.

are your slings safe?



This 24-ton heat exchanger, made by the Texas Metal Fabricating Company, is shown being lifted by Wickwire 3/8" Multiflex Type 1 Single Leg Slings—one of many types of Wickwire Slings which are serving American industry today.

One faulty sling can play havoc with your crews, your equipment, the materials they handle and your pocketbook. That's why it is so important for you to make absolutely sure of the quality of the slings you use . . . why we believe that Wickwire Slings are your safest buy.

You see, we control the quality of the steel that goes into Wickwire Slings by carefully making our own. From this steel, we make our own rods and, from these rods, our own wire. Then, our own wire rope. And, finally, we make our own wire rope into Wickwire Slings. Every step is handled right in our own plants. *This enables us to completely test our product throughout every stage of its production . . . and it's your assurance of the safest sling possible.*

It's a mighty good reason why SAFETY DEMANDS THAT YOU GET THE WICKWIRE STORY TODAY. For complete details, contact the nearest sales office listed below.

CF&I **WICKWIRE**
WIRE ROPE SLINGS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Denver • Houston • Odessa (Tex.) • Phoenix
Salt Lake City • Tulsa
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit
Emlenton (Pa.) • New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Montreal • Toronto 4472

For more facts circle 615 on Reply Card

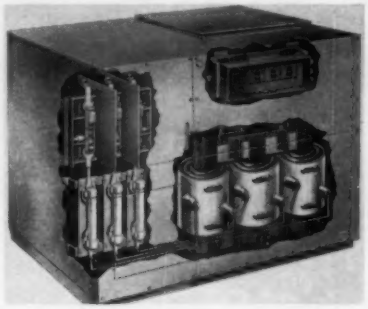
NEW PRODUCTS

(Begins on page 186)

when applied. The product is said to remove stains and darkened edges from unsealed wood floors maintained with floor oils, be non-flammable, have a low degree of toxicity. Masury-Young Co.

19—LOAD CENTER with space-saving feature

This single-unit integral distribution center is announced as requiring up to 42 per cent less space than most distribution centers. It combines in one piece all three sections necessary for load center applications: incoming line, transformer, and outgoing feeder. Designed to pass through normal-size factory doors in an upright

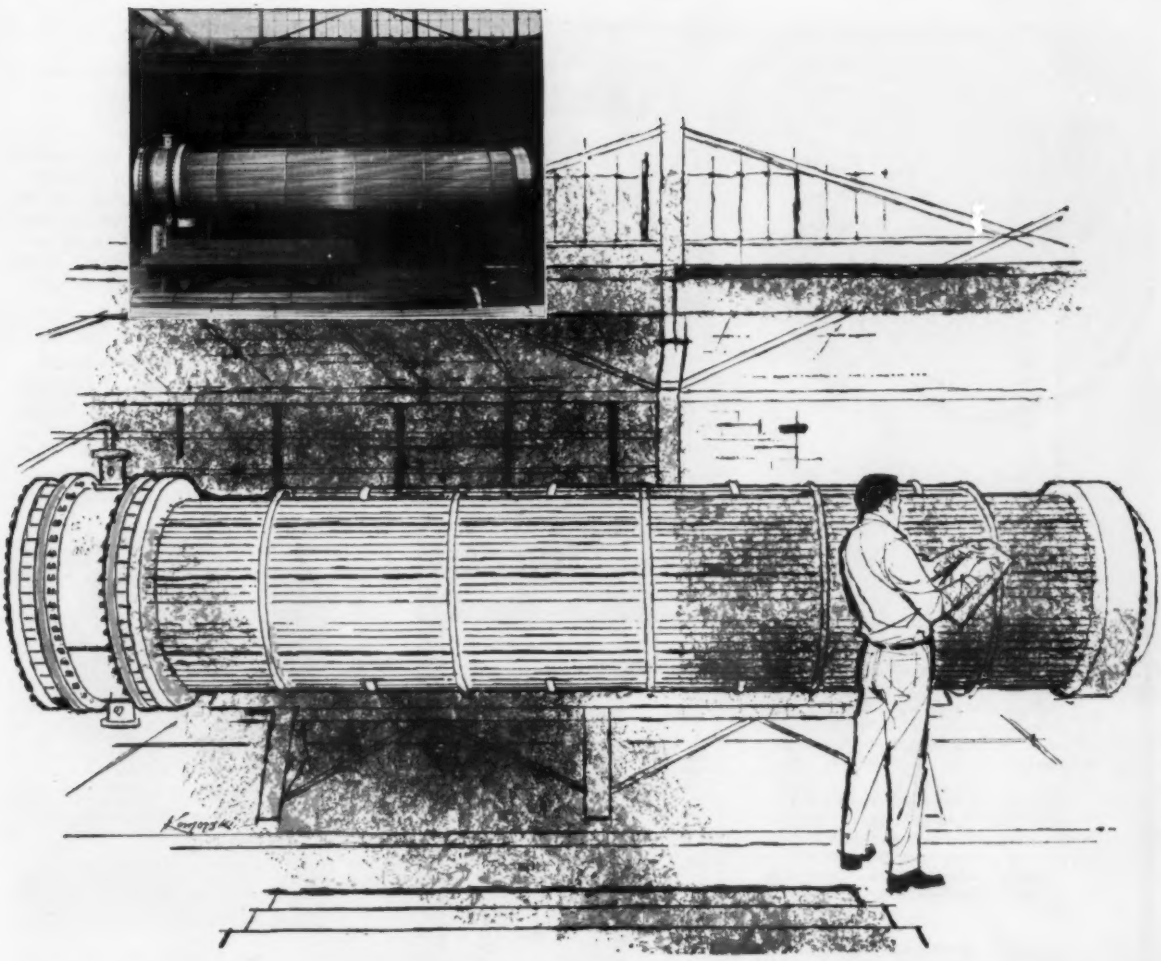


position, the unit's installed height is 80 in.—10 in. lower than usual. For moving purposes the unit is 78 in. high, because the 2-in. high shield over the air vent on top of the center is readily removed. It can be shipped, rolled and installed in one piece. Its dimensions are 37½ to 42½ in. deep and from 56 to 106 in. wide.

The new line is available in four standard ratings from 75 to 225 kva for smaller industrial plants and similar installations. Standard voltage ratings from 208 to 15,000 v may be had. The unit's quiet 56 decibel noise level is 10 decibels under NEMA standards for transformers of similar ratings, according to company. All operations and routine maintenance can be accomplished from front of center. Switches, fuses, circuit breakers and taps are accessible through doors or removable panels on the front. The center can be installed as close to a wall as local electrical codes permit. The units have solderless connectors for incoming and outgoing lines. All lines can be brought in from top or bottom of unit. General Electric Co.

20—FIRE RELIEF VENT operates above the roof line

The Pyrojector, a quick-opening "fire vent" to permit rapid escape of smoke, heat and gases in event of fire, installs and operates entirely above roof line. Two double-wall dampers are opened outward by coil springs when a fusible link melts at 212 F. This creates a roof opening of 28 sq ft. This relief near the fire source helps limit horizontal spread



WESTERN SUPPLY SPECIFIED ALCOA ALUMINUM ALL THE WAY

on these 100% aluminum Dilution Coolers

The exchanger illustrated is one of a number furnished by Western Supply Company, Tulsa, Oklahoma, for a recent low-pressure polyethylene installation. They selected Alcoa® Aluminum for this service because of its protection of product color and stability, good heat transfer properties and corrosion resistance. For the same reasons, aluminum has also found wide use in ammonium nitrate cooling, sour gas treatment and many low temperature processes.

As Western Supply Company sums up the case for Alcoa Aluminum Heat Exchangers: "In our experience Alcoa Aluminum is a sound, low-cost solution to many of the problems encountered in petroleum refining, natural gasoline manufacturing, petrochemical and chemical processing."

If *you* have heat transfer problems affecting tubes or other components of either the channel or shell side, investigate aluminum! Aluminum offers corrosion resistance and good heat transfer properties at minimum cost, and has excellent physical properties at extremely low temperatures. Get details in the FREE BOOKLET, *Alcoa Aluminum Heat Exchanger Tubes*. Mail the coupon today!

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA
889-E Alcoa Building, Pittsburgh 19, Pa.

☐ Send me the FREE BOOKLET, Alcoa Aluminum Heat Exchanger Tubes.

☐ My heat exchanger problem is:

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

For more facts circle 616 on Reply Card

CHICAGO TRAMRAIL

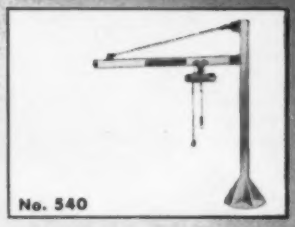
JIB CRANES

engineered for easier handling and long years of service

A TYPE AND SIZE FOR EVERY NEED

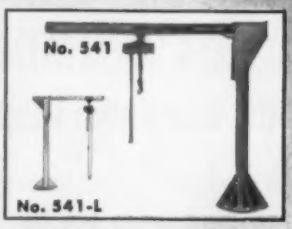
No. 539—Wall Bracket Type with 180° Rotation. Equipped with bronze bearing mounted in machined steel castings for accurate alignment and ease of rotation. Capacities 1,000 lbs. to 10,000 lbs. Lengths to 25 ft.

No. 540—Self-Supporting Jib Crane with 220° Rotation. Bronze bearing in machined steel casting. Self-supporting column supplied with either bolted or imbedded base. Capacities to 10,000 lbs. Spans to 20 ft.

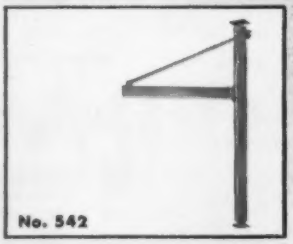


No. 541—Self-Supporting Jib Crane with Complete 360° Rotation. Outstanding features include: machined steel bearing band welded to column to assure concentricity; four load carrying rollers with needle bearings mounted in head in machined cast steel trunnions; precision thrust bearing mounted in top of column to carry vertical load; two adjusting screws for leveling boom. May be equipped with collector rings for power supply for continuous rotation. Capacities to 10,000 lbs. Spans to 20 ft.

No. 541-L—New Light Duty Free-Standing Jib Crane with 360° Rotation equipped with full floating roller bearings. Ideal for mounting on machine tools. Capacities 250 lbs. and 500 lbs. Spans 6 ft. to 16 ft.



No. 542—Mast Type Jib Crane with 180° Rotation; top and bottom supports. Bronze top bearing and tapered precision roller bottom bearing insure easy positioning without drifting. Capacities to 6000 lbs. Spans to 20 ft.



Write for complete Jib Crane Catalog showing applications, charts and dimensions. A valuable guide to the selection of jib cranes. Sent promptly upon request.

CHICAGO TRAMRAIL CORPORATION

1324 S. KOSTNER, CHICAGO 32, ILL.

For more facts circle 617 on Reply Card

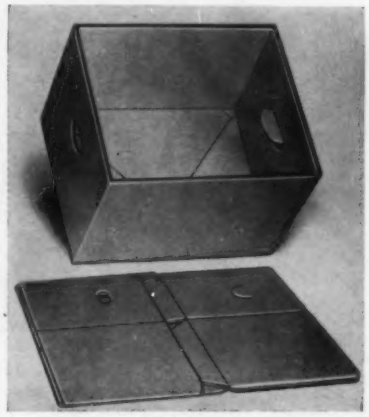
NEW PRODUCTS

(Begins on page 186)

of flames, company points out, and aids fire fighting by revealing the location of the flames. The Pyrojector is weatherproof when closed, it is noted, and can be used for extra ventilation in good weather. It can be installed single or in groups above likely fire sources. Form 701 describes unit. The Swartwout Co.

21—TOTE BOX folds flat to save on storage space

Announced as one of the most economical of space-saving tote boxes, the Miracle Tote Box is designed to pop open for use —and pull flat again for storage. Made of double-walled corrugated material, this one piece box has an automatic fold-



ing action which makes it readily collapsible. It can be locked open into a sturdy tote box in seconds, says company, and pulled flat again when required—as many as 50 to 100 times without showing wear. Besides its space saving advantages, the Miracle Tote Box is claimed to stand up under rugged conditions. It comes in two sizes, the larger being 17 by 13 by 14½ in., and the regular size, 15 by 12 by 10 in. It is supplied with covers which make it suited for dust-free storage of inactive parts. Heavy-gage polyethylene liners are available at slight extra cost. They serve to keep the box clean when used for wet, oily or greasy materials and to protect it from hot acids. The Paige Co.

22—TAIL LIGHT gives trucks after-dark protection

The Trailer-Lite is a self-contained electric tail light with its own power supply. It may be used on small in-plant industrial lift trucks and materials handling vehicles, as well as highway equipment. It was engineered to prevent after-dark rear-end collisions, says manufacturer, and it complies with safety requirements for rear-end lights. The complete kit consists of a non-breakable bright red tail lamp with its own built-in independent silver contact switch, a 3-ft long weather-

new Misericordia Hospital will

SAVE THREE WAYS*

BY INSTALLING

FW PACKAGED STEAM GENERATORS

Lowering one of the 43,500 lb FW Packaged Steam Generators into the basement of the Misericordia Hospital.

SCHEDULED for completion early in 1958, the $8,000,000, 210-bed Misericordia Hospital, Bronx, N.Y., will be fully equipped with the finest and most modern facilities obtainable.

All steam requirements will be supplied by three fully-automatic Foster Wheeler Packaged Steam Generators, each rated 17,500 lb/hr at an operating pressure of 125 psi. Each two-pass steam generator contains 1857 sq ft of heating surface and generous furnace volume. Staggered tube arrangement permits a high heat transfer rate and low exit gas temperatures. These FW Packaged units also offer the following cost-saving advantages:

* **SAVE TIME** — because they were completely shop fabricated and delivered by truck direct to the building site, all ready to set in place and connect to power, fuel and steam lines.

* **SAVE SPACE** — because of exceptionally low ratio of unit size to quantity of steam produced. Measuring only 12'1½" high, 10'11½" wide and 16½' long, these 17,500 lb/hr units are installed on small, low-cost foundations.

* **SAVE MAINTENANCE** — because they are specially designed for easy servicing and inspection. Consisting almost entirely of water heating and steam producing pressure parts, there is a minimum of refractory and tile maintenance.

FW Packaged Steam Generators are available in capacities from 10,000 to 60,000 lb/hr and pressures to 1300 psi. For complete information, send for Bulletin No. PG-55-3. *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 618 on Reply Card

"We ran this ad 6 years ago"

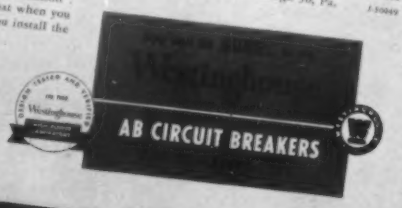
Save with SAFER... SURER AB BREAKERS

ONE OF 2500 WESTINGHOUSE CIRCUIT BREAKERS INSTALLED IN THE GULF BLDG., PITTSBURGH

24 YEARS OF CONTINUOUS SERVICE without failure, replacement or maintenance

2500 thermal-type branch circuit breakers, installed and then forgotten, in the Gulf Building, Pittsburgh, Pa., have written an unparalleled story of circuit protection. B. E. Moore, Building Superintendent, reports that after 18 years of service without failure, replacement or maintenance, these breakers were recently checked in random tests and were found to be "as good as new". On both overload and short circuit protection, they performed precisely to their original specifications. And on inspection, mechanical parts and contacts were found to be in "excellent condition". What better proof can we give you that when you install Westinghouse Circuit Breakers you install the finest in dependable, grief-free equipment. They are masterly with maintenance time, too—when trouble is cleared from the circuit, a flip of the breaker handle restores power instantly. No running after fuses, nothing to replace, nothing extra to buy.

For assistance on any circuit protection problem, contact your nearest Westinghouse office, or write for Bulletin No. DB-29-060, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. J-10499



We still say...

only circuit breakers are so trouble-free

fuse replacement can be costly in outages and labor

YOU CAN BE SURE... IF IT'S Westinghouse

For more facts circle 619 on Reply Card

NEW PRODUCTS

(Begins on page 186)

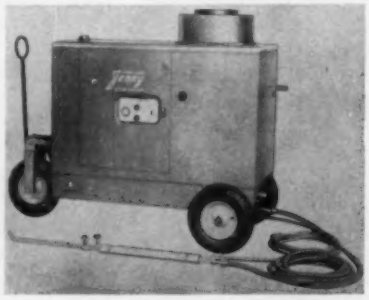
proof insulated wire lead, and steel encased twin-powered dry battery and a rigid steel battery mounting bracket; it sells for less than $7.00. The tail light may be installed singly or in tandem; its mounting bracket screws or bolts to the bottom or side of the rear end of the truck or trailer. Burgess Battery Co.

23—DRILLING MACHINE can work on hard masonry

The Eager Beaver is announced as a highly efficient, portable concrete drilling machine for drilling holes in reinforced concrete, brick tile, marble, granite, asphalt or any hard masonry material. It is designed to drill clean holes up to 4 in. diam and up to 18 in. or more in depth at the cutting rate of up to 2 in. per min. The machine will drill either horizontally or vertically and is powered by plugging into a 110-v electric circuit. Beaver Products Inc.

24—STEAM CLEANERS for rugged cleaning jobs

Known as Series 1800 Hypressure Jennys this line of 11 steam cleaners has 180 gph of steam cleaning capacity for removing dirt and grease from industrial machinery, material handling equipment,

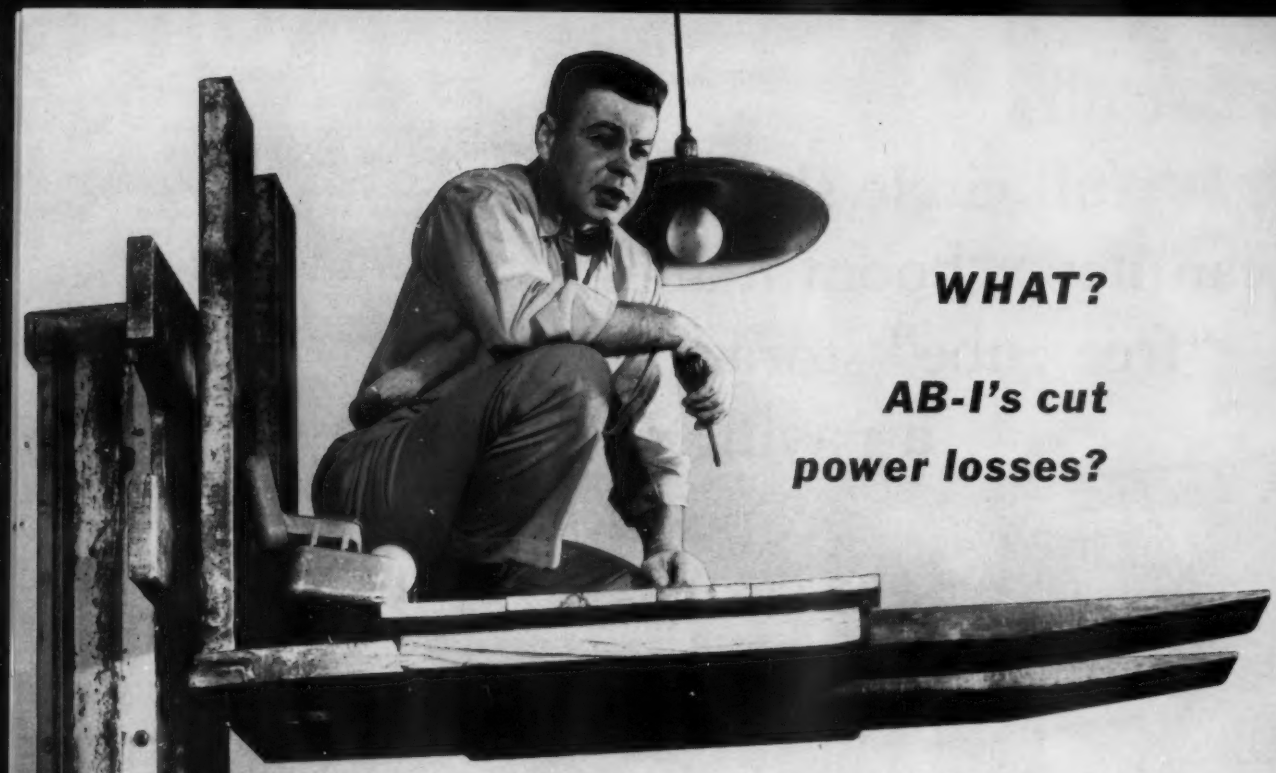


parts etc. Designed for production line and extra-heavy duty cleaning, and for single gun or two gun operation, these cleaners offer a choice of oil-fired or gas-fired units in stationary, portable or trailer mounted types. For use where electric current is not available, units with gasoline engine drive, in place of electric motor, may be had. The Model 1858, shown, offers finger-tip control of flushing and rinsing capacities to 480 gph. This and other models in the line are described in Bulletin 17-A-41. Homestead Valve Mfg. Co.

25—LEVELING JACK raises or lowers easily

Style JS Leveling Jack is designed for easy leveling of machine tools, assembly fixtures, surface plates and other equipment. The jack safely supports up to 20 tons, it is said, and raises or lowers easily by means of adjustable nut. Compensation for floor slope is made by con-

For more facts circle 620 on Reply Card ——→



WHAT?

AB-I's cut power losses?

CONSIDERABLY. Current flows so freely through the low impedance in circuit breakers that power loss is usually no more than that in the line. Electrically welded connections, low-current-density loading of parts and silver-alloy contacts keep watt loss to a minimum. Compared to other protective devices, this adds up to substantial dollar savings.

AB-I's also pay off by saving the cost of unnecessary down time. It takes but a flip of the handle to restore power after a circuit has been cut out due to a fault or overload. There's no lost time checking, finding and installing replacement parts.

There are at least four ways you save hard cash when you use AB-I's . . .

1. In cost of original equipment
2. In cost of replacement
3. In less power consumed
4. In less production time wasted.

AND, you provide the most positive protection for your equipment.

Get the complete story from your Westinghouse distributor. Ask him for Descriptive Bulletin 30-250 or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-30270

YOU CAN BE SURE... IF IT'S

Westinghouse

Coles full circle slewing cantilever boom makes "free cube" storage a paying proposition

Coles works closer to stacks for accurate spotting, maximum SELECTIVITY

COLES CRANES

JOLIET 10, ILLINOIS

Write for booklet "101 COST-CUTTING WAYS"

Photo courtesy of International Harvester Company's Tractor Works · Chicago, Illinois

Now, available L.P.G.-diesel- or gasoline-electric powered in capacities from 5 to 50 tons. Available on long term lease arrangement, too.

For more facts circle 621 on Reply Card

NEW PRODUCTS

(Begins on page 186)

cave spherical radius in lift screw and aligning disc which serves to provide adequate "float" and maintain horizontal alignment of equipment. Machine vibration and creepage are minimized through use of special mounting pads—eliminating need for anchor bolts on many installations. It is available in 12 models, ranging in height from 1¾ to 3¾ in. Enterprise Machine Parts Corp.

26—LUBRICANT for heavy loads and reducing wear

Molylube No. 110 is a solvent refined petroleum oil containing additives, which impart rust preventive qualities, and a stable dispersion of molybdenum disulfide. According to company, it displays high lubricity and polar affinity for metal surfaces that are greater than those displayed by regular mineral oils. It is suggested for the lubrication of bearings and machine parts operating at high temperatures. Bel-Ray Co., Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 263-264.

27—PUMPING UNITS dispense direct from original drums

Graco Inductors are announced as pumping units designed to dispense—direct from original 55-gal drums—caulking compounds, putties, semi-fluid sealers, adhesives and all similar materials that may be too viscous even to be poured from their containers. They seal material in container, and serve to prevent contamination, spillage, channeling, aeration and waste. It is explained that inductors start at top of material in drum, then, combined with an air powered pump, they literally suck their way to the bottom, scraping drum sides and evacuating material from drum. Pumps are available in power ratios to meet all volume and pressure requirements. Inductor units are also available in half-drum and 5-gal pail sizes. Gray Co., Inc.

28—VALVE ACTUATORS can work in difficult conditions

All-metal actuators for control valves are announced for use under conditions of atomic radiation, high temperatures and corrosion. Designed for both pneumatic and hydraulic control systems, these actuators are available with suitable valves as complete control units, or as additions to existing valve installations. Some are designed to function either "air to open" or "air to close" and are reversible in the field.

For use in highly corrosive atmos-

For more facts circle 622 on Reply Card——→

For general illumination, The Scott fixture by Sylvania provides soft, even light, has extremely high, 89.8%, illumination efficiency—giving a bonus in performance at no additional cost.

For close-work areas, mounting The Scott parallel to workers' line of vision brings maximum lengthwise shielding benefit into play. Lightweight plastic louver combines outstanding appearance with installation and maintenance features.

Supplementary lighting no longer needed...

Sylvania's Scott Fixture now provides precision lighting at Bendix Aviation

ENGINEERS WORKED OUT an unusual and successful lighting approach at the Eclipse Pioneer Division of Bendix Aviation Corp., Teterboro, New Jersey. In a semi-industrial area, they used a commercial-type fixture... Sylvania's *Scott* . . . to provide general illumination for precision motor assembly work.

Here The Scott does a double lighting job by eliminating the supplementary lighting system used previously:

1. **The Scott,** with its all-plastic reflector-shield, gives Bendix 110-116 footcandles of light at working level. It holds shadows and glares to a minimum, makes difficult seeing tasks easier.
2. **The Scott's** clean, attractive appearance harmonizes with the modern interior. Bendix personnel proudly show the installation to visitors as one more way Bendix protects the quality of its products.

Sylvania's *Scott* fixture offers many economies in both industrial and commercial applications. Because it has an exceptionally high, 89.8%, efficiency, *The Scott* will, in many cases, give the desired illumination levels with fewer fixtures—along with quality lighting.

Next time you have an illumination problem either in industrial or commercial "close-work" areas, investigate the many advantages of lighting with Sylvania's *Scott*. For complete information, contact your local Sylvania Lighting Specialist, or write directly to:

SYLVANIA ELECTRIC PRODUCTS INC.
Department C-3,
Lighting Division—Fixtures
One 48th Street,
Wheeling, W. Va.

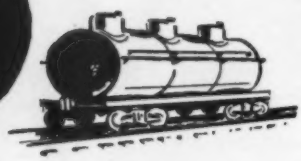
SYLVANIA
... fastest growing name in sight

LIGHTING • RADIO • TELEVISION • ELECTRONICS • ATOMIC ENERGY

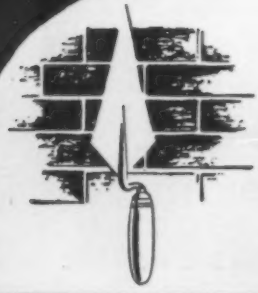
Can Atlas solve your
CORROSION PROBLEM?

. . . WITH ENGINEERING DESIGN?

. . . WITH TECHNICAL ADVICE?



. . . WITH HIGHEST QUALITY MATERIALS?



. . . WITH COMPLETE CONSTRUCTION FACILITIES?

. . . OR ALL FOUR?

To-day complete and permanent answers to your corrosion problems require not just one of these services, but all four. Frankly, how else can you be sure your corrosion problem receives the individual attention it deserves for a positive solution? Only Atlas places this integrated service at your disposal:

ON-THE-SPOT TECHNICAL ADVICE—technically-trained representatives are located in all major cities throughout the United States.

ENGINEERING AND DESIGN—a completely staffed engineering department uses tested and proven ideas based on over a quarter century experience.

HIGHEST QUALITY MATERIALS—the most complete line of corrosion-proof cements, linings, coatings, and rigid plastics, was pioneered and developed by Atlas.

COMPLETE CONSTRUCTION FACILITIES—experienced field crews make permanent installations of linings and brickwork, regardless of size, anywhere in the world.

The answer is YES! Atlas is prepared to furnish the best and most economical solution to your plant-wide corrosion problems. Atlas can do the job.

For complete facts write for Bulletin CC-3.

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

For more facts circle 623 on Reply Card

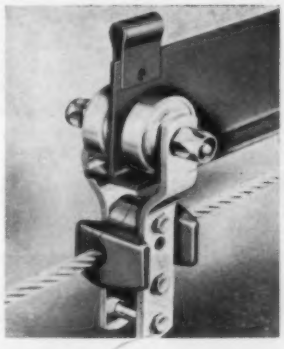
NEW PRODUCTS

(Begins on page 186)

pheres, one model has stainless bellows and stem. Its frame is made from cadmium plated, cold rolled steel. It comes in three ranges of signal pressures from 3 to 15 psi to 9 to 45 psi. Possessing a maximum thrust of about 3000 lb, the actuator is compact in size. One unit, available "air to close" only, is made completely of stainless steel. This line also includes smaller models. Fulton Sylphon Div., Robertshaw-Fulton Controls Co.

29—HEAVY DUTY TROLLEY for overhead conveyors

The T-10 is a heavy duty trolley specially designed for use with new and existing installations of company's ⅜-in. Bush-Lock Overhead Cable Conveyor under adverse conditions. The trolley's

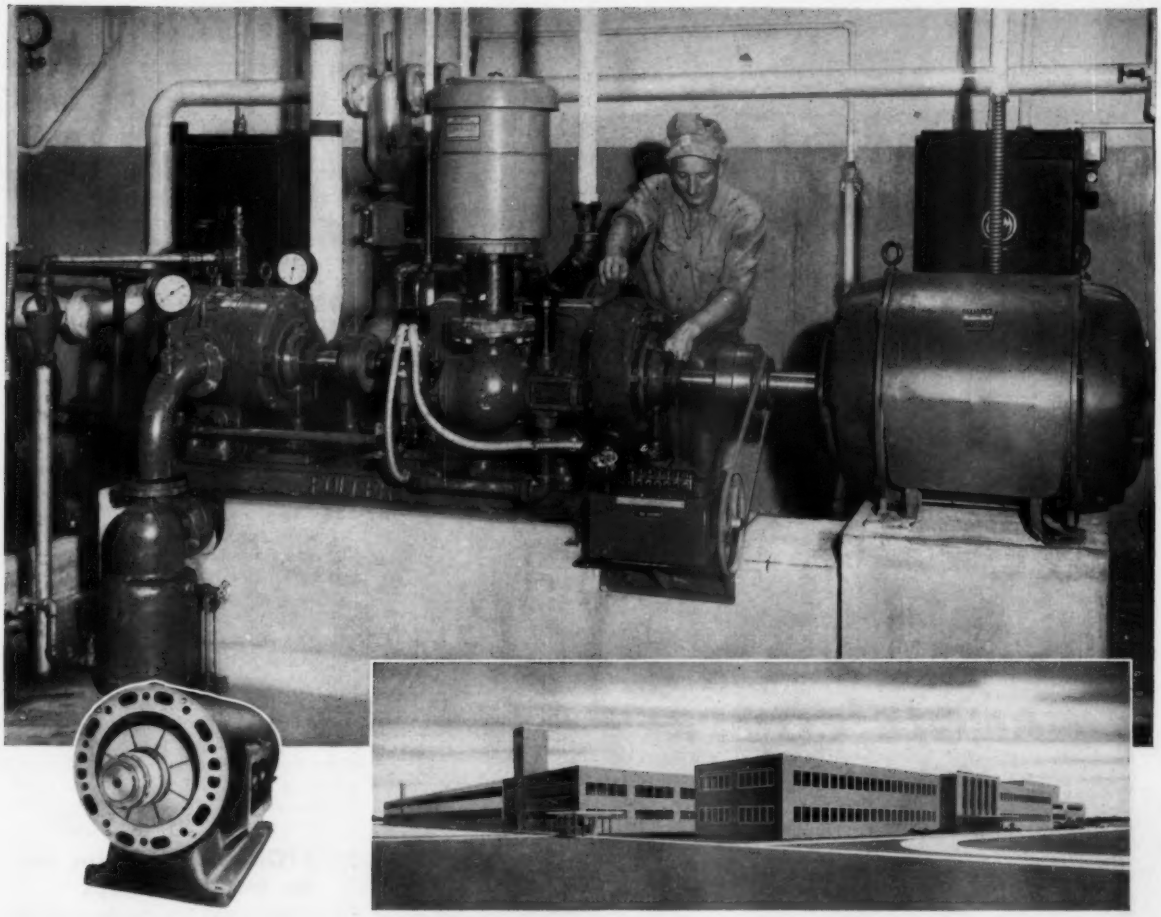


wheels feature pressure lubrication, a special nut to protect the grease fitting, a completely enclosed back, and a felt hub seal. This design is suggested for applications involving industrial washers, paint spray booths and other operating conditions where excessive dust, moisture or temperatures of 150 F are encountered. (For higher temperatures, the T-10 T, with a special seal is recommended by manufacturer). The T-10 comes in both two- and four-wheel models with nominal capacities of 250 and 375 lb. Capacities rate downward for various operating conditions. The E. W. Buschman Co.

30—MOUNTING PAD steps down machinery noise

This compact, machine mounting pad, called Air-Loc, is made from Geon polyvinyl resin, produced by B. F. Goodrich Chemical Co. The pad is intended for use with textile looms, metal punch presses, meat cutters, industrial electric motor mounts, pumps, machine tools. Actual composition of the pad is Geon resin, sisal, and granulated cork fused into an integrated pad. (Compounding and processing can be altered to meet individual plant requirements.) The Geon resin serves as a binder and to make the pad resistant to water, oil, grease, many acids and alkalis.

Air-Loc is tough and yet remains



Modern, reliable air power for a modern, efficient plant

When Electric Controller & Manufacturing Company, Division of Square D Company, Cleveland, Ohio, designed and built its new four and one half million dollar plant, they had their sights set on economical production at high-level efficiency.

One of the items given serious consideration was the supply of compressed air, a considerable quantity of which is used throughout the plant. Fuller Company is justifiably proud to be associated with such a plant in being awarded the contract to furnish a Fullery Rotary Two-stage compressor as the main source of general plant air . . . a modern, efficient compressor for a modern, efficient plant. This machine has a capacity of 281 c.f.m., at 100-lb pressure.

Fuller Rotaries do a very big job no matter how tough the going. It's a job that, more and more, is being multiplied throughout all industry, these machines having gained wide acceptance as an efficient, reliable source of air power.

The key to Fuller's long life, and smoother operation, is *rotary motion*, which provides large capacity in relation to size, simple direct drive from motor or internal-combustion engine, minimum of working parts, air-flow free from pulsations, lack of vibration, continuous service with minimum supervision and maintenance. Installation in cramped quarters or on ordinary flooring is simple and practicable.

For a full description of Fuller Rotary Compressors and Vacuum Pumps, we would like to send you a copy of Bulletin C-5A. Write for your copy today.

FULLER COMPANY

138 Bridge St., Catasauqua, Pa.

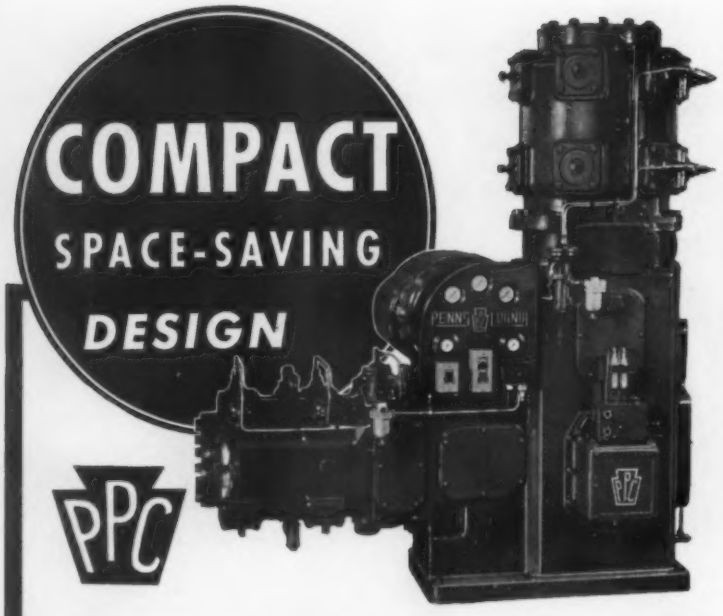
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION

Chicago • San Francisco • Los Angeles • Seattle • Kansas City • Birmingham

C-299
3425

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

For more facts circle 624 on Reply Card



Pennsylvania

ANGLE COMPRESSORS

These compact, heavy duty compressors are in demand wherever flexibility is desired . . . wherever space-saving is essential!

- PACKAGE DESIGN makes close quarter installation practical.
- SAVES HORSEPOWER—Maintenance is economical, too.
- FOUNDATION—A small foundation is all that is needed. Installation and relocation a minor matter.
- BUILT-IN MOTOR requiring no foundation.
- BUILT-IN INTERCOOLER with automatic drain. Full force feed lubrication to frame and cylinders. Automatic shut down in event of oil failure.
- AIR CUSHION VALVES noted for long life and tight seating are constructed without bolts, nuts or screws to work loose or burn fast.

The answer to your compressor requirements may very well be these compact, self-contained ANGLE type compressors. Write for descriptive bulletin HAE.

PENNSYLVANIA PUMP AND COMPRESSOR COMPANY
Main Office and Works: Easton, Penna.

EARNING CONFIDENCE SINCE 1920. E-PP342-1156

PENNSYLVANIA PPC PUMP AND COMPRESSOR COMPANY

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 186)

flexible, says manufacturer, and will reduce noise and absorb vibrations and shock loads. A feature of Air-Loc is integrated cross-grid embossing. This cross-grid surface is not cemented or glued to the body of the pad, but an integral part of it. Cementing or bolting are declared unnecessary except in special situations. When machinery must be relocated, the pads may be removed and re-adjusted under the feet of the machine. Clark-Cutler-McDermott Co.

31—PIPE FITTING indicates liquid flow inside

Fig. 1366E Sight Flow Fittings are used to indicate flow of liquid in a pipe line. They may be installed horizontally, vertically, diagonally or upside down. Fitting has a spring compensated, hinged, indicator gate which moves in proportion to flow and is visible from either side of the fitting, it is noted, even when the liquid is dark or discolored. Windows are removable for cleaning. Fittings are available in sizes ⅜ to 6 in. inclusive, in brass, cast iron or steel—flanged or tapped. They may be supplied with electrical contacts to operate a bell or light if the liquid flow should stop. Contacts are designed for 12-v maximum. Wm. W. Nugent & Co., Inc.

32—STORAGE UNITS for use on workbench tops

These small parts bin storage units are specifically designed for use on workbench tops. The bin boxes hang from rails, are

easily rearranged for parts assembly sequence. They are said to be particularly useful for benchtop operations such as service, maintenance, repair and certain assembly operations involving small component parts. Removable bin boxes are offered in five sizes: 6 in. front to back, 2¾ in. deep and widths from 1¾ to 11⅛ in. Bathey Mfg. Co.

33—RUBBER-LINED VALVE for use in chemical lines

This rubber lined horizontal swing check valve is designed to be used in acid and chemical lines for corrosion resistant purposes. The valve body is rubber lined

CHIKSAN

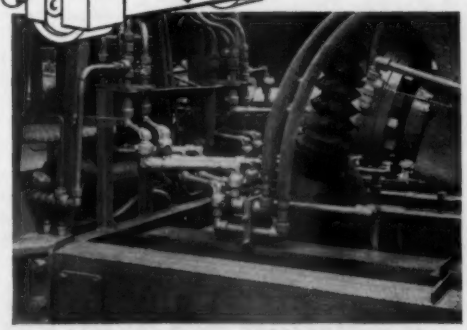
Works wonders with hydraulic lines

Chiksan Swivel Joints rotate full 360° in 1, 2 and 3 planes handling air, hydraulics, fuels, water, oil and other fluids.

CHIKSAN SWIVEL JOINTS

Give metal lines the flexibility of rubber with the safety and service life of steel. And with free swiveling 360° rotation, Chiksan Swivel Joints eliminate line failure due to bend radii and torsion fatigue.

Investigate Chiksan Swivel Joints for application in your plant and on your products. Their modest cost is quickly repaid in savings of down-time, replacements and maintenance.



Installed on hydraulic lines of a Salem-Brosius forging manipulator, these Chiksan Swivel Joints have been in continual service for over 3 years with no down-time to date.

CHIKSAN

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

FOR FREE CATALOG WRITE DEPT. 225

CHIKSAN COMPANY — BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division) Houston 1, Texas • Chiksan Export Company • Chiksan of Canada, Ltd., Edmonton, Alta.

For more facts circle 626 on Reply Card

CM HOISTS

VERSATILE TOOLS that belong in every efficient plant

CM CYCLONE

Light Weight—Heavy Duty High Speed Chain Hoist Capacities from ½ to 10 tons

Made of tough aluminum alloy. Carries with ease. 1 ton model weighs only 36 pounds. 42% fewer parts. Requires little maintenance. Sealed-in lifetime lubrication. 96% efficient. Equipped with CM-Alloy flexible welded load chain. The best there is in hand hoists...yet reasonably priced.

CM PULLER

Lifts or Pulls At Any Angle
¾, 1½, 3 and 6 ton capacities

For lifting, pulling, skidding, stretching, straightening. Use at any angle. Eliminates dangerous makeshift methods. Automatic brake. ¾ ton model weighs only 13 pounds. CM-Alloy flexible welded load chain. Time savings quickly repay low initial cost.

● **ALSO** Meteor Wire Rope Electric Hoists (⅛ to 5 tons), Lodestar and Comet Electric Chain Hoists (¼ to 2 tons), CM Trolleys and CM Cranes.

CALL THE CM DISTRIBUTOR FOR CATALOGS, PRICES AND QUICK DELIVERY FROM STOCK.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

For more facts circle 627 on Reply Card

NEW PRODUCTS

(Begins on page 186)

cast iron or fabricated steel. Trim can be any alloy, hard rubber, plastic or Teflon. Port plate is steel core, molded, and drilling on flanges will be standard 125 lb. Manufacturer claims flow reduction, or loss of head, is negligible. Valve comes in sizes from 1 to 14 in. La Favorite Rubber Co.

34—OUTDOOR TRUCK is big capacity handler

The operator sits above the left front fender for a clear view of the load on the Clarklift Y-350, a 35,000-lb capacity pneumatic tire fork truck. The machine was designed for heavy lifting and tiering work around steel mills, lumber yards

and similar outside locations. A power shifted, four-speed transmission coupled with a torque converter and a 404 cu in., six-cylinder gas engine are incorporated to provide power for operation through mud and snow and over rough terrain.

Direction selector levers and lift-lower-tilt levers are on the steering column. Power steering and air service brakes are standard. Accessibility for servicing is provided by a hood which slides back on rollers to expose the engine. The hydraulic system is controlled by a feather-type valve; it gives a lift speed of 26 fpm loaded. The truck has underclearance of 14 in. at the upright. It is 241 in. long, and has an outside turning radius of 231 in. Its maximum speed is 16 mph, forward and reverse. Industrial Truck Div., Clark Equipment Co.

35—AFTERCOOLER for compressed air lines

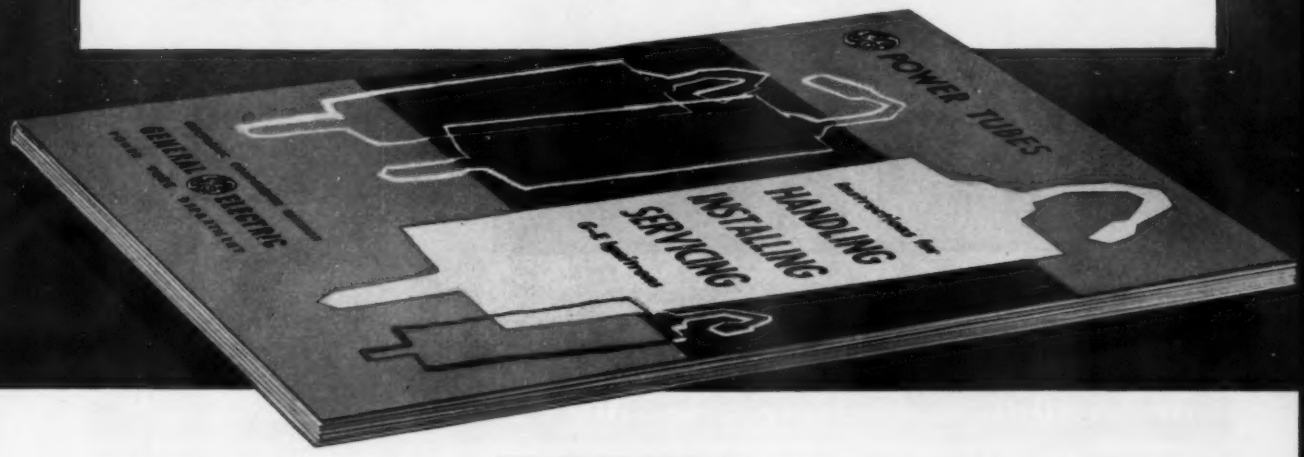
For removing oil and water from compressed air lines, this aftercooler consists of four of company's standard air filters connected in series and mounted so as to occupy a floor space of only 18 in. square. (These filters are 36-in. cylinders, 6 in. in diameter, in which are mounted smaller cylinders with perforated bottom and filled with Fiberglas.) Compressed air enters at the top, flows downward, then up through the Fiberglas, which acts as a series of baffles. The filters in series act as condensers. In addition to removing oil from the lines, they condense the water vapor present into entrained moisture and remove it from the lines.

According to manufacturer, four of these filters in series accomplish more

CAN YOU ANSWER THESE QUESTIONS ON PROPER CARE AND MAINTENANCE OF WELDING IGNITRONS?

	YES	NO
1. Store ignitrons in a vertical position and in their cartons?	☐	☐
2. Shut off ignitron water supply immediately after operation?	☐	☐
3. Check rectifiers when installing ignitron replacements?	☐	☐
4. Is a slight amount of play desirable in ignitron connections?	☐	☐
5. Measure outlet water temperature to check ignitron temperature?	☐	☐
6. Does a "wet" ignitor show a tube has been operated at too high temperature?	☐	☐
7. Shut off power to thermostat controls immediately after operation?	☐	☐

	YES	NO
8. Can nearby electrical fields cause arcs within an ignitron?	☐	☐
9. Can inadequate cooling-water flow cause ignitron failure?	☐	☐
10. Can most premature ignitron failures be prevented by proper maintenance?	☐	☐
11. Will an ignitron with a "wet" ignitor still operate for some time?	☐	☐
12. Does mercury on the anode or glass seal render a tube permanently useless?	☐	☐
13. Should tops of ignitrons on standby be kept slightly above room temperature?	☐	☐
14. Should negative voltage be applied to the ignitor?	☐	☐



New G-E welding-ignitron manual supplies these and other answers to help you extend tube life . . . cut downtime . . . increase output!

"INSTRUCTIONS for Handling, Installing and Servicing General Electric Ignitrons" is a complete guide to proper care and maintenance of welding ignitrons. It shows you how to get full-length, trouble-free tube service that is sure to help lift the production efficiency of any welder installation, regardless of size.

In this new General Electric manual, you will find such practical information as how to store ignitrons . . . operating conditions that mean top performance . . . how to prevent common causes of tube failure.

Obtain a *free* copy from your local General Electric tube distributor, or complete the coupon below and mail! *Electronic Components Division, General Electric Company, Schenectady 5, N. Y.*

Answers. *Yes: 1, 3, 5, 6, 8, 9, 10, 11, 13.*
No. 2, 4, 7, 12, 14.

Progress Is Our Most Important Product

GENERAL ELECTRIC

181-1D2

For more facts circle 628 on Reply Card

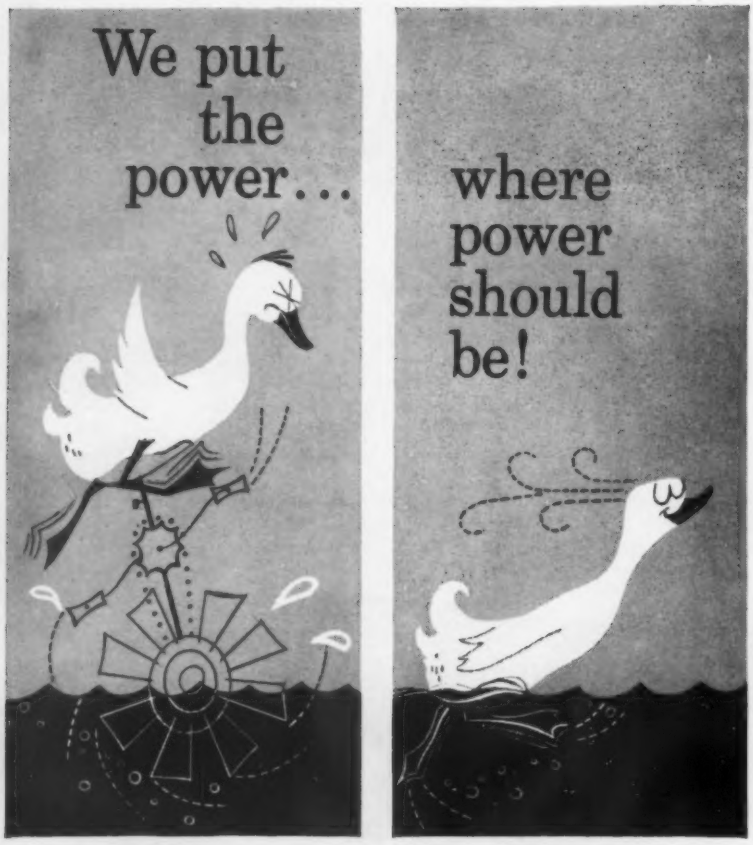
General Electric Company—Tube Sales
CART #3—Schenectady 5, New York

Please send, free of charge, "Instructions for Handling, Installing and Servicing G-E Ignitrons," ETI-1428, to:

NAME.....

ADDRESS.....

CITY.....STATE.....

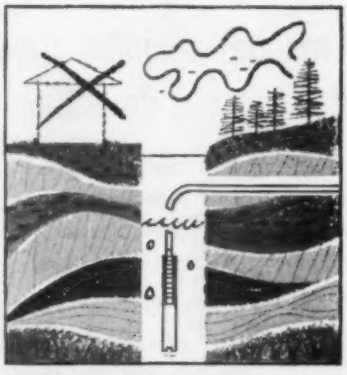


Install SUMO SUBMERSIBLES for maximum water-pumping efficiency

SUMO Submersible Pumps—perfectly aligned, close-coupled motor and pump units—run under water. And right there is the solution to a lot of pumping problems.

You don't need a pump house. Controls and pressure tank can go anywhere. Narrow or crooked wells are no problem. You simply attach a SUMO to the discharge pipe, connect it to your power supply and run it inside the well. Forget long drive shafts, bearing spiders, alignment problems, noise, vibration, adjustments or priming. And forget trouble—a SUMO can't freeze or flood out. It's safe from tampering, too.

Switch on power and expect years of attention-free operation. Only minimum maintenance is required. Spare parts are immediately available from nationwide service centers.



Sumo Submersibles are installed in the well and operate completely under water. Close-coupled pump and motor design assures fully efficient pumping for any water service.

WRITE FOR BULLETIN B1000 for full details and operation data.

SUMO PUMPS, INC.

Dept. 3 P. O. Box 983 Stamford, Conn.

SUMO SUBMERSIBLE Water Pumps

. . . the pumps that stand the test of time

For more facts circle 629 on Reply Card

NEW PRODUCTS

(Begins on page 186)

rapid heat transfer and condensation of water vapor than occurs in a run of several hundred feet of relatively thick-walled 2-in. pipe. Primary advantage, it is pointed out, is lowering operating cost due to the fact that water is not needed as a cooling agent. The units are 16-gage carbon steel sheet, tested to 500 lb internal pressure, considered adequate for many air line installations. Airlenco, Inc.

36—COOLING TOWERS offer design improvements

Packaged Double-Flow Aquatowers are announced in three models with capacities rated nominally for 80, 100 and 125 tons. They have internally mounted motors, more efficient drift eliminators and a rugged combination mechanical equipment support and water distribution piping assembly, manufacturer states. It is pointed out that their packaged design permits quick installation—simple piping and wiring put the towers into service. The Marley Co.

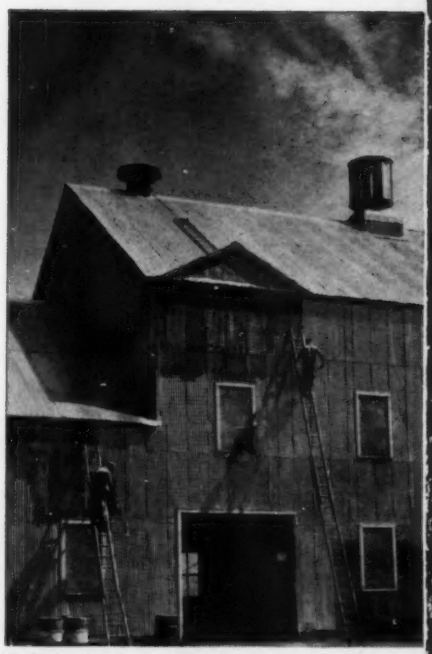
37—FLOOR TOPPING for high speed trucking areas

Compounded for use in high speed hand and power trucking locations, Sternite is applied in a ¼ in. layer over concrete. This flooring material is said to form an extremely hard surface that eliminates wheel drag and will not depress under wheels. Sternite is announced as containing a liquid emulsion of high purity, new combinations of cements plus flinthard aggregate. It is furnished in 250-lb units ready for mixing. The material is dark brown, and said to be non-slip, non-porous, lightweight, fire-retardant, wear resistant and easily applied and feather-edged. It is claimed to withstand loads of 3000 psi after 48 hr—equivalent to a 24,000 lb load on a truck with four 2-in. steel wheels. Product Manual 86 describes Sternite. The Monroe Co., Inc.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

38—SOLENOID VALVE is bubble-tight at 5000 psi

Type SBTDW is a stainless steel solenoid valve claimed bubble tight even at 5,000 psi working pressure. The valve is a small, direct lift, angle type machined from 316 stainless steel bar stock, a construction designed to provide exceptional corrosion resistance. A Teflon seat eliminates metal-to-metal seal and serves to assure bubble-tight operation even with such gases as helium, nitrogen and carbon dioxide. It can be used over a wide



Before: Workmen patch holes quickly and inexpensively, preparing for a bright new coat of aluminum paint.

After: Spick, span, and protected for years with aluminum paint and roof coating manufactured by **American Paint Company, Duluth, Minnesota.**

Mine Shaft Building restored with Aluminum Metalite Paint and Aluminum Roof-Alum

This mine shaft building is a part of the copper mining operations of the Calumet Division, Calumet & Hecla, Inc. These properties are located at Calumet, Michigan. With the severe winter weather conditions, the structure was in bad repair—roof and siding were rusting, even pitted through. But it looks as new today, under a fresh coat of aluminum paint and aluminum roof coating, as it did thirty-five years ago.

Before and after photographs show how this aluminum coating of American Paint Corporation repaired and restored this building without major expense. First, holes were patched with Roof-Alum (aluminum asphalt roof coating and fabric), followed by an over-all coat of Roof-Alum on roofs and siding for weatherproof protection—then a spray coat of Metalite aluminum paint for years of good appearance.

ALCOA does not make paint, but ALCOA® Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two FREE booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable, up-to-date information on all types of aluminum paint and aluminum asphalt coatings.

Aluminum Company of America
Paint Service Bureau
1790-E Alcoa Building, Pittsburgh 19, Pa.

Please send me your FREE booklets:

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☐ *Aluminum Asphalt Roof Coatings Make Time Stand Still*

I am interested in protecting_____

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Company_____

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For more facts circle 630 on Reply Card

CUT YOUR OVERHEAD

in materials-handling problems with

Æ ELECTRIC CUSTOMIZED

LO-HED HOISTS

- Cuts overhead space requirements
- Five classes lift ¼ to 12 tons
- Five suspensions available
- Four types of controls
- Shrouded bottom block
- Two automatic brakes
- Anti-friction bearings throughout
- One-hand operation
- Full load tested

Write for literature describing the Customized Lo-Hed Hoist or the pace-setting AE Standard Lo-Hed, available in 2- and 3-ton capacities —the latest word in modern hoist engineering and materials.

AMERICAN ENGINEERING COMPANY

Dept. H-104, WHEATSHEAF LANE & SEPVIVA ST., PHILADELPHIA 37, PA.

Canadian Subsidiaries: Affiliated Engineering Corporations, Ltd., Montreal, P. Q. . . . Bawden Industries Ltd., Toronto, Ont.

AE Products are: Taylor, Perfect Spread and Vibra-Grate Stokers, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Marine Deck Auxiliaries.

For more facts circle 631 on Reply Card

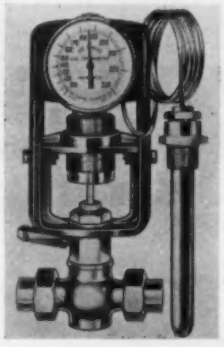
NEW PRODUCTS

(Begins on page 186)

temperature range, company adds, is suited to applications where high pressure is combined with relatively little flow. Its direct lift action provides instantaneous opening and closing even with viscous fluids. Pipe sizes are ⅛ and ¼ in. with 1/16, 3/32, ⅛ or 3/16 in. port sizes. Coils are available in desired voltages. Atkomatic Valve Co., Inc.

39—INDICATING REGULATOR is self-operating type

Industrial processes and hot water systems can be checked and automatically controlled by the No. 11 Regulator, it is announced. It features a front-mounted dial thermometer designed to give continuous temperature readings of process under control. Because the 4-in. dial thermometer is mounted in front, the



regulator can be installed in tight spaces, it is pointed out, and this also reduces chance of damage to indicator. It is designed for use wherever a number of uncontrollable factors might cause process temperature to deviate.

Self-operating unit consists of a thermal bulb connected by flexible tubing to a diaphragm bellows, which operates a valve mounted in pipe line to be controlled. No electricity or other outside power source is needed. Thermal bulb, filled with a volatile fluid, is placed in tank, vat or line where temperature is to be regulated. Any temperature changes will vary the pressure of the volatile fluid. Pressure is transmitted to bellows which operates valve gradually to hold process at constant temperature. Regulator ranges are available to permit control from 60 to 260 F. Bulletins 329 and 330 give details. Powers Regulator Co.

40—ROOF EXHAUSTER, axial or centrifugal flow

Featuring low smooth contours, this roof exhauster is made in axial and centrifugal flow types, constructed of heavy gage aluminum with ball bearing type motor. It comes in a wide range of types and sizes. The motor is cooled by outside air—not exhausted air. Rubber vibration isolators are designed for each size unit

MOLDED CASE CIRCUIT BREAKERS

Magnetic only type ETI circuit breakers have convenient, externally located adjustment controls. Available in F, J, K, KL, L and M frame (3 to 800 amperes continuous ratings), 2 or 3 pole, 600 v a-c, 250 v d-c.

Only I-T-E gives you convenient external trip adjustment

In motor control and resistance welding applications, adjustment of protective devices to a required setting is important. One of the many features of the ETI circuit breaker is its convenient externally adjustable magnetic trip device. When it is required to adjust the trip to a finer degree, adjustment is made from the front of the breaker without interrupting service or encountering live conductors. The range of instantaneous trip adjustment means greater protection for motors and resistance welders. When a short circuit occurs, all poles open simultaneously. And enclosed terminals protect personnel, yet permit easy cable connections. All these extra values in I-T-E molded case circuit breakers are yours at no extra cost. Send for complete information or contact your nearest I-T-E authorized distributor.

I-T-E CIRCUIT BREAKER COMPANY • **Small Air Circuit Breaker Division**

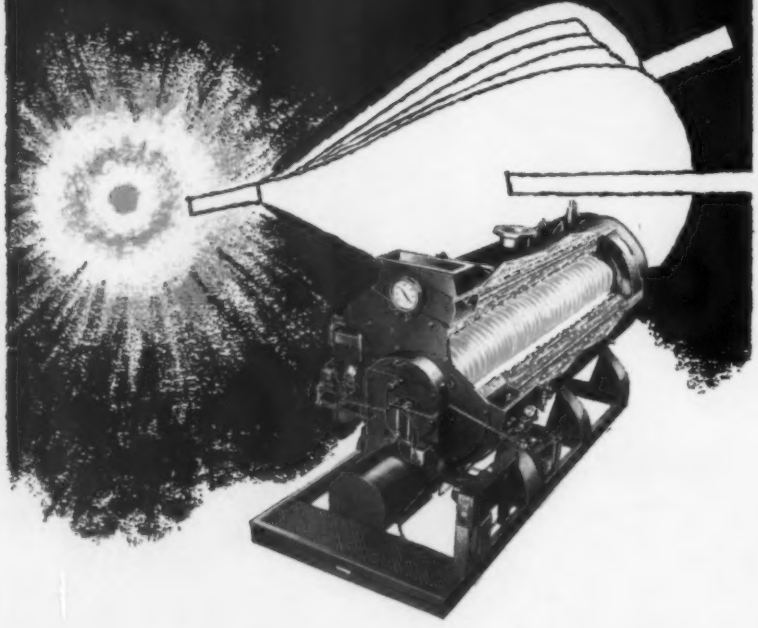
19th & Hamilton Sts., Philadelphia 30, Pa.

IN CANADA: EASTERN POWER DEVICES, LTD.

For more facts circle 632 on Reply Card

How do you make an ember glow?

Blow on it!



It takes air to promote combustion and when air enters the Cyclotherm combustion chamber at a tangent and with velocity up to 200 mph, really efficient combustion results. The air, assuming cyclonic shape and motion, combines with the fuel to form a flaming vortex spiraling the entire length of the firetube. This Cyclonic Combustion achieves 65% heat transfer efficiency in the firetube alone. An additional 15% is produced in the single pass of return tubes. Cyclotherm guarantees a minimum of 80% efficiency in only two passes.

Cyclotherm also includes an electronic control system for automatic operation. On models up to 60 hp burner automatically shuts off when steam demands are satisfied; resumes when steam is again needed. On larger models, precision modulation automatically regulates firing rate from 30% to 100% without loss of efficiency.

A complete package Steam and Hot Water generator, Cyclotherm is designed, built and assembled by Cyclotherm Division, National-U.S. Radiator Corp., with one manufacturing responsibility behind the entire job. Models 18 to 750 hp; 15 to 200 psi; burns oil and/or gas.

Among additional Cyclotherm advantages are:

- From cold start to full power in 15 to 20 minutes
- No stack—only a simple flue
- Maintenance costs cut 30% to 50%
- No special foundation needed
- A worldwide service organization
- Saves one-third the space required by other package boilers.

YEARS AHEAD IN STEAM GENERATION

CYCLOTHERM®

Steam & Hot Water Generators

Cyclotherm Division,
National—U. S. Radiator Corp.
32 E. First St., Oswego, N. Y.

Clip to your letterhead

Send me your new booklet "Cyclotherm Cyclonic Combustion"

For more facts circle 633 on Reply Card

NEW PRODUCTS

(Begins on page 186)

and motor speed. Dynamically balanced aluminum fan blades are designed for quiet operation. A large exit area serves to reduce exit losses and increases efficiency. The centrifugal type is described as a non-overloading backward curve type fan that is sparkproof. Greenheck Fan & Ventilator Corp.

41—HYDRAULIC ELEVATOR is battery operated

With a flip of the lever, the Model BH-7.5 lifts loads up to 750 lb, it is announced, and without effort on the part of the operator. The hydraulic system for raising the lowered platform is designed to maintain low pressure under maximum loads, and is a complete package unit.

Two 6-v automotive type batteries in series are standard for powering the hydraulic system; but one 12-v battery may be used. There's a built-in battery charger —all that's necessary is to plug in the cord to a 115-v circuit. Charging period is 8 hr. An ammeter shows charge rate and shuts off automatically when batteries are charged. The elevator has a lift of 71 in. and an overall height of 83 in. Standard platform is 23¾ in. long by 24 in. wide, and is 6 in. above floor in lowered position. Barrett-Cravens Co.

42—SWITCHBOXES offer increased wiring capacity

Many electrical installation problems can be solved by the new non-gangable Redege Series of switchboxes. They are 2½ in. deep, 2 in. wide and 3 in. long, and have a capacity of 12.8 cu in. to permit "through" wiring for a continuous circuit of No. 14 wire. With this increased capacity, these new non-gangable boxes afford more wires, it is pointed out, and are especially economical for large building tracts. Each switchbox has side scoring for precise wall alignment with markings of ⅝ in., ¾ in. and ⅞ in. depths.

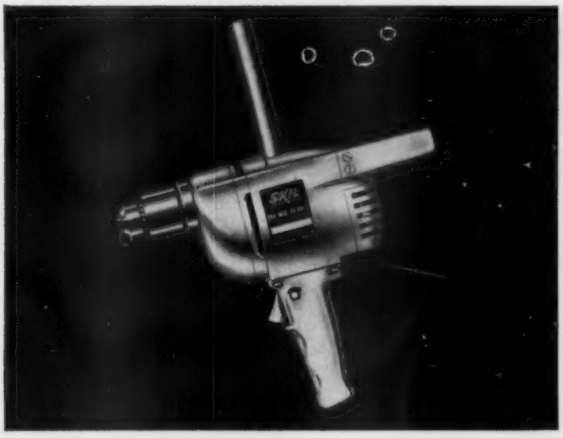
The boxes are square cornered, with nail holes to permit diagonal as well as straight-through nailing. There is a ½ in. knockout in the bottom of the unit, two cable pry-outs in each side and each end. The new series includes switchboxes

Saves one-third cutting time. Monarch Mobil Homes, Inc., St. Paul, put a SKIL Model 299 Router to an unusual test. The problem: to cut aluminum already mounted on a curved surface. Trials with other routers proved the tool would do the job but soon burned out under the strain of production metal cutting. SKIL Model 299 not only did the cutting perfectly but saved one-third cutting time!

Saves cost of heavy-duty equipment. Steel King Company, Milwaukee, needed a versatile, inexpensive portable saw to cut 22-gauge steel paneling. They tried a SKIL 7¼" Model 874 and found it made every cut necessary. Rips, cross-cuts, 45's and pocket cuts are routine in the 22-gauge steel. "Does the job, cuts down excessive material handling and costs less," say the owners of the company.

Metalworkers SAVE with SKIL Tools

Saves $100.00 per unit. Griffin Tank and Welding Service of Dallas, custom builds geographic photographic equipment. This equipment must be lightproof, weatherproof, dustproof and air tight. "When SKIL drivers were substituted for hand tools for fastening, we saved over $100.00 per unit (5 gross of #8 screws), and quality improved tremendously," says C. B. Jones, Chief Engineer.



SAVE with New ½" Drill. All new design—shorter, narrower, one pound lighter! New power for fast drilling on the toughest jobs. Improved helical gears deliver power with top efficiency. No matter what you have to drill, cut, sand or grind, there's a SKIL tool to do the job faster, better, cheaper. Let your SKIL distributor show you why. Or use the coupon below for further information.

SKIL
PORTABLE TOOLS

Made only by SKIL Corporation, Chicago 30, Ill.
Factory branches in all leading cities.

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_____Please send me name of nearest distributor.

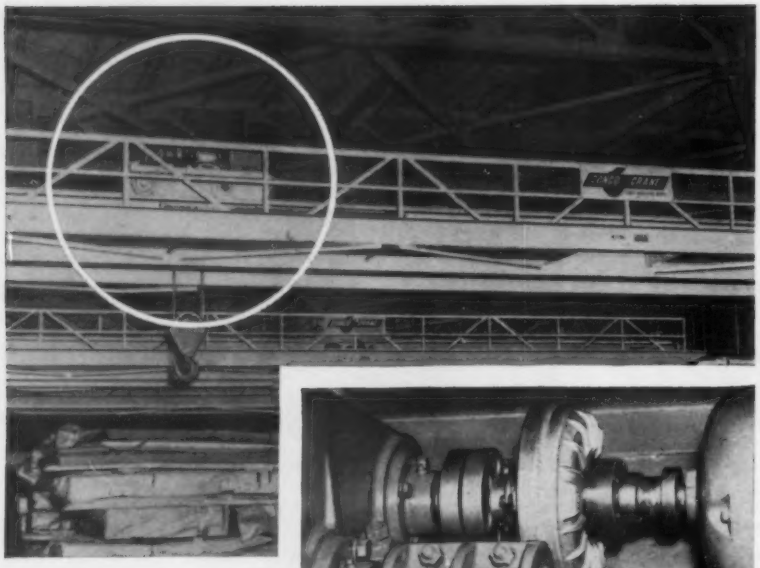
_____Please send me FREE booklet on SKIL power tools.

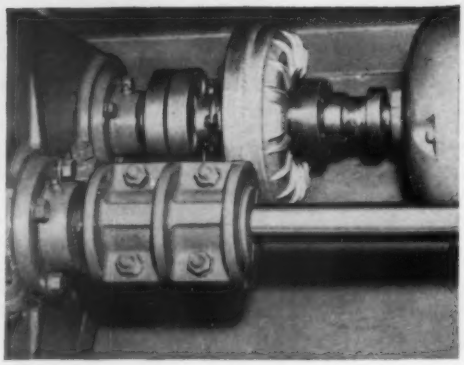
Name_____Title_____

Address_____

City_____Zone____State_____

For more facts circle 634 on Reply Card





Above. Two of three Conco Engineering Works 10-ton, 55' span, 3-motor, floor-operated, overhead cranes in a mid-western steel warehouse. Right. Close-up of the Twin Disc Fluid Coupling installation showing simplicity and compactness of drive arrangement.

Here's how Twin Disc Fluid Couplings improve overhead crane operation

Load handling is easier for any crane when electric motors are equipped with Twin Disc Fluid Couplings. That's because, when starting the load from a dead stop, the "slip" of the hydraulic fluid permits acceleration quickly from low rpm to working torque.

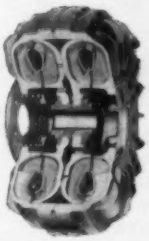
This smooth, cushioned acceleration eliminates dangerous jerking, swinging and swaying on load pick-up.

The pay-off comes in increased production, lower power bills because of minimized current surges and less equipment maintenance since the hydraulic fluid cushions out destructive shocks.

Also, fluid couplings often permit use of smaller capacity motors, for motor capacity can be based on running load rather than starting load.

Twin Disc Fluid Couplings and HYDRO-SHEAVES® are offered by all leading crane and hoist manufacturers . . . fluid couplings to 850 hp in capacity . . . HYDRO-SHEAVES to 50.

Write for Bulletin 144-D, Dept. DS, Twin Disc Clutch Company, Racine, Wisconsin.



TWIN DISC

TWIN DISC

Fluid Couplings

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa

For more facts circle 635 on Reply Card

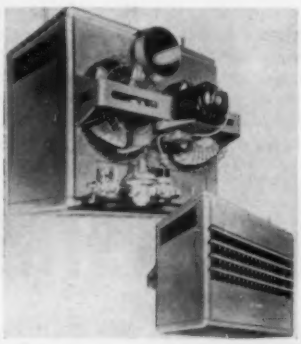
NEW PRODUCTS

(Begins on page 186)

for loomwire installations which have two non-metallic cable clamps, and units for armored cable and flexible steel conduit, equipped with two armored cable clamps. Boxes are available with ears, with no ears, with stud bracket, or strap bracket. National Electric Products Corp.

43—GAS UNIT HEATERS of 300,000 Btu capacity

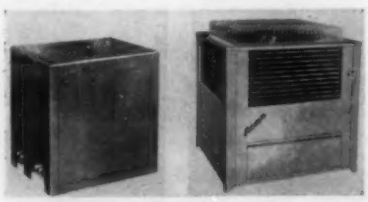
Models US300-F and US300-B, propeller fan and centrifugal blower powered, respectively, are announced as the largest of suspended gas unit heaters. In these



300,000-Btu units, ample air movement for effective air distribution at a minimum noise level is achieved by use of two smaller fans or blowers in place of one large one, it is pointed out. On the Model US300-F, the two 15-in. fans are driven by a single ⅓ hp motor. On the other heater, each blower has its own ⅓ hp motor. The heaters are 33½ in. high, 36 in. wide—about 40 in. deep. Catalog GN-57 gives data. Reznor Mfg. Co.

44—LIQUID CHILLERS are water- or air-cooled

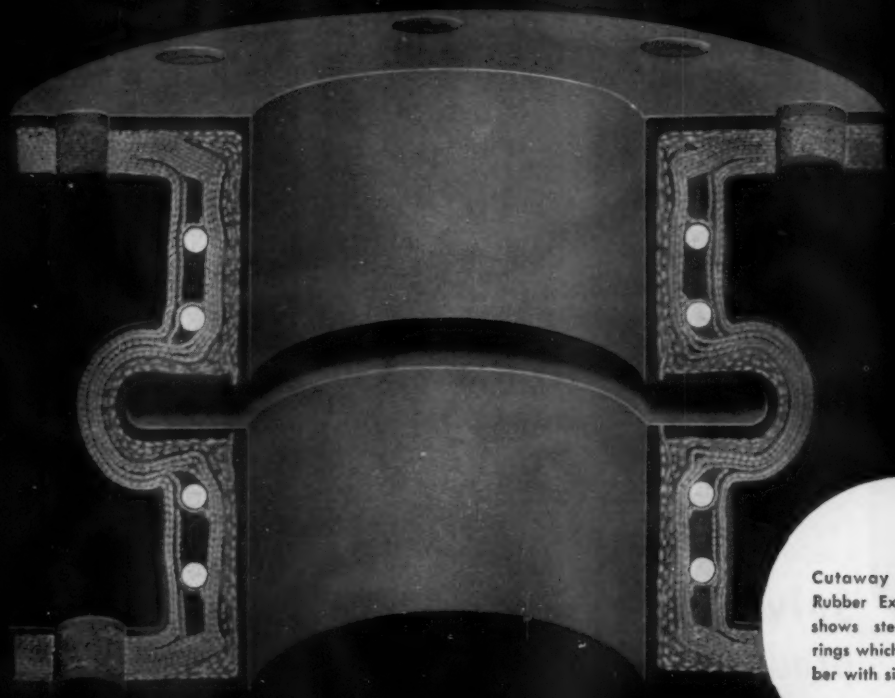
Flow-Pacs are packaged water chillers with capacities from 1¾ through 5 hp. The compact units, one series water-cooled and the other air-cooled, are offered for air conditioning or industrial liquid cooling applications. They are announced as inexpensive and easy to install. The units have hermetic refrigeration systems, and are shipped complete



with refrigerant charge and factory-wired operating and protective controls.

Because of Flow-Pac's compactness, multiple-unit installations are possible in situations where more than a 5-ton capacity is required. Units can be con-

MORE OF THE GARLOCK 2,000



Cutaway of Garlock Rubber Expansion Joint shows steel reinforcing rings which vary in number with size of joint.

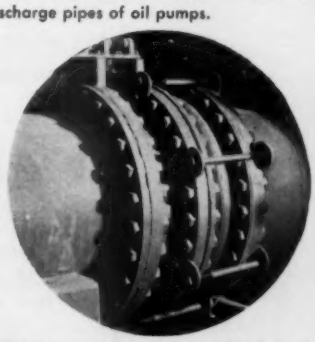
CORRECT VIBRATION, NOISE and FLANGE BREAKAGE...

GARLOCK RUBBER EXPANSION JOINTS are made from high-grade rubber, combined with plies of sturdy cotton duck and reinforced with steel rings. Practically any size or type expansion joint is available for service handling any liquid or gas. For example:

TYPE	USE
Rubber Expansion Joints (Spool-type, U-type, Tapered, Offset)	Hot or cold water Mild acids or caustics Brine, air, exhaust steam
Neoprene Expansion Joints	Oil Other Petroleum Derivatives
Teflon*-lined Rubber Expansion Joints All-Teflon Bellows-type Expansion Joints	Strong acids and caustics Halogenated Solvents Pure Foods

Rubber Expansion Joints are another important part of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. The *only* complete line. That's why you get *unbiased* recommendations from your Garlock representative. Call him or write for Rubber Expansion Joint Folder AD-137.

Garlock Expansion Joint on 2½" suction and discharge pipes of oil pumps.



Garlock Expansion Joint on 30" pipe line connecting propeller-type circulating water pumps.

THE GARLOCK PACKING COMPANY, Palmyra, New York

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

*DuPont Trademark

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints, Fluorocarbon Products

For more facts circle 636 on Reply Card

Solve air quenching and production cooling problems

THIS MONTH

with "HY-V" AIR JETS

"Hy-V" Air Jets can shoot a blast of cooling air up to 74 feet without ducts. Mount them high on walls or columns. Then fans can't be damaged by trucks . . . cords can't be cut by wheels. These fans can be depressed 45° and aimed left or right.

Use "Hy-V" Air Jets for air quenching extrusions and for cooling men exposed to heat from ovens, furnaces, forges or molten metal. Men become less fatigued, need less time out. And remember, hot weather is on the way. So start now to solve this problem. Mail coupon today.

MAIL COUPON RIGHT NOW

De Bothezat FANS

DeBOTHEZAT FANS DIVISION, Dept. PE-557
American Machine and Metals, Inc.
East Moline, Illinois

☐ Send bulletin with complete data on "Hy-V" Air Jets.
☐ Have a DeBothezat representative call.

COMPANY

ADDRESS

CITY ZONE STATE

ATTENTION MR.

For more facts circle 637 on Reply Card

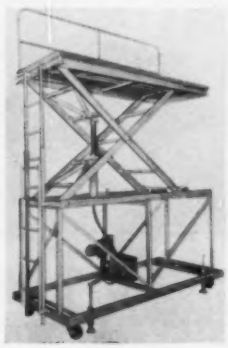
NEW PRODUCTS

(Begins on page 186)

nected in parallel or in series and can be installed side-by-side or stacked vertically. For outdoor installations, the air-cooled Flow-Pac is weather-protected for year-around exposure to the elements, and completely enclosed. It has high-level inlets to minimize clogging with leaves and dirt, and it discharges air vertically. Catalog 560 gives engineering details. Acme Industries, Inc.

45—LIFT PLATFORM affords work levels to 15 ft

Hydraulically operated, this work platform is reported to offer safety and convenience for production and maintenance work above ground level. Flexibility and portability for both indoor and outdoor use are also stressed. In lowest position, the platform is 5 ft above floor level.



Hydraulic power raises it to any height up to 10 ft. Power can be supplied in any of three ways: by ¼ hp electric motor; by self-contained, battery-operated motor; or by hand pump. Double rack and pawl hold platform at work height. Access to platform is by a telescoping ladder.

Of steel construction, the work platform is mounted on four swivel 8-in. diam ball-bearing casters. A screw-type leveling jack is provided at each corner for stability on level or uneven floors. Platform is 33 in. by 7 ft 8 in.—(large enough for three men)—and is covered by formed, expanded steel. There's a 3-ft high handrail the length of one side. Rated load is 1250 lb. Ballymore Co.

46—SOLDER MACHINE feeds to preheated parts

The Braze-O-Matic is announced as a new concept in feeding solder automatically through magazines to pre-heated parts for solder fabrication. Its timing mechanism operates and regulates the flame and the exact amount of solder in connection with an index table. It localizes heat at the point of fabrication in the same manner as would be done manually, it is explained, to accomplish high quality soldering at increased production rate. The equipment is reported

1,000 WORDS of Specifications covering:
RLM 48" & 96" Two-Lamp Direct Fluorescent Porcelain Enameled Units with 8%-15% Upward Light

1,000 WORDS of Specifications covering:
RLM 48" & 96" Three-Lamp Direct Fluorescent Porcelain Enameled Units with 8%-15% Upward Light

1,000 WORDS of Specifications covering:
RLM 60" Two-Lamp Direct Fluorescent Porcelain Enameled Units with 8%-15% Upward Light

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RLM 48" & 96" Two-Lamp Semi-Direct Fluorescent Porcelain Enameled Units with 20%-30% Upward Light

1,000 WORDS of Specifications covering:
RLM Dome Porcelain Enameled Reflectors

1,000 WORDS of Specifications covering:
RLM Deep Bowl Porcelain Enameled Reflectors

1,000 WORDS of Specifications covering:
RLM Symmetrical Angle Porcelain Enameled Reflectors

1,000 WORDS of Specifications covering:
RLM Porcelain Enameled Reflectors for High Mounting

1,000 WORDS of Specifications covering:
RLM Glassteel Porcelain Enameled Diffusers

1,000 WORDS of Specifications covering:
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Covering the HIGHEST Industrial LIGHTING STANDARDS in RLM History!

From incandescent to fluorescent . . . from porcelain enameled Dome Reflectors to latest 20—30% Upward Light porcelain enameled fluorescents . . . these RLM Specifications are the highest in history! In fact, today's RLM minimum standards are higher from both important standpoints: *quality construction*, as well as *quality lighting*. That is why the RLM Label on lighting equipment today is the buyer's assurance of outstanding industrial lighting advantages such as are listed here.

For each RLM-labeled unit it takes over a thousand words of quality specifications to cover the basic, nationally-accepted minimum standards for efficiency, performance and basic construction. In all, there are 10 types of industrial lighting units for which RLM Specifications have been developed. With each specification running over 1,000 words, that makes a total of over 10,000 words of specifications! You'll find them all in the latest RLM Specifications Book. For your complimentary copy, use the coupon or write: RLM STANDARDS INSTITUTE, Suite 831, 326 W. Madison St., Chicago 6, Ill.

Highest Industrial Lighting Standards in RLM History assure these advantages:

Higher light output • Lower-cost installation
Better protection against glare
More seeing comfort • Easier re-lamping
Increased brightness control
Reduction of light loss
Safety from electrical hazards
Protection against rust and corrosion

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R-1652

For more facts circle 638 on Reply Card

. . . has the appearance and performance you need

Looking for something new, something better, to control or limit the pressure of air, gas, oil? Use this new Honeywell Industrial Pressure Switch . . . designed to complement the most attractive equipment or panels . . . constructed to give lasting performance in the most rugged applications. Use it to make your equipment more automatic, improve your system, provide trouble-free service.

Here are the facts you'll want to know:

- Designed for flush or surface mounting
- Die-cast case is dust and corrosion resistant
- Visible mercury switch position (SPST or SPDT)
- Front-of-case set-point and differential adjustment
- Selection of pressure ranges to 3000 psi
- Specifically designed and constructed for industrial use . . . ½" pipe connection
- Available in explosion-proof construction

For complete data, a consultation on applications, prices for any quantity . . . get in touch with your local Honeywell sales engineer. He's as near as your phone. MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA: Write for Specification sheet S1011-3 "New Honeywell Industrial Pressuretrol"**

MINNEAPOLIS **Honeywell**
BROWN INSTRUMENTS
First in Controls

NEW PRODUCTS

(Begins on page 186)

to work with all known forms of soldering and all types of materials. It is designed for one operator with a signal system for adequate lead time to call for more supplies. Castle Machines, Inc.

47—PROXIMITY PICKUP has connector on coil

Model 4920-AN is a hollow coil proximity pickup. It features a connector on the coil and is for use with company's proximity transducer systems. It is claimed ideal for counting small parts such as screws, nuts, washers and bolts. It utilizes a hollow phenolic table around which the sensing coil is wound. As a high-frequency carrier operated transducer, it works on a principle similar to a

military mine detector, and is designed to sense aluminum, brass or copper as well as iron and steel.

The coil can be used as part of a chute or tube carrying metal parts which can slide or drop through. Connected by means of a cable to a control unit, it causes the latter to generate d-c voltage or operate relays. The control unit can be used to actuate electro-mechanical or electronic counters and automatic machinery. Manufacturer says that when electronic counters are used, counting rates in excess of 60,000 per minute may be obtained. Electro Products Laboratories.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 263-264.

48—COUPLING for low cost equipment installation

Type L-093 is a zinc die cast flexible coupling for low cost original equipment use. Installation, removal, assembly or disassembly is readily accomplished, since this coupling consists simply of two bodies with jaws and a one-piece spider-type cushion. Lubrication is never needed, says manufacturer, and dust, dirt, mud, water or adverse conditions do not affect performance. The load is transmitted by cushion compression, it is noted; the metal jaws are not subjected to wear.

The cushion spiders out into six load ends which are in plain sight at all times. On non-reversing loads only three of the

For more facts circle 640 on Reply Card→

Here's PLANT-LAYOUT FLEXIBILITY that CUTS COSTS

with "mobile" machines on Barry Mounts

High-priority, short-run orders pose no set-up problems for Inland Steel Products Company, of Milwaukee. In ½-hour or less, punch presses equipped with Barry Machinery Mounts are moved right where they are needed —often to an entirely different department—and are in full production.

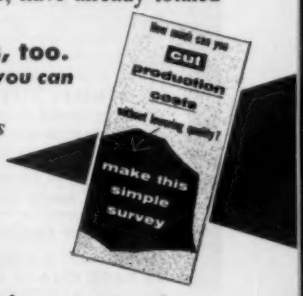
Efficient organization of production lines, plus mobilization with Barry Mounts, enables this famous fabricator of sheet-metal building products to handle special orders profitably—even for runs of only a few hours. And savings, in installation cost alone, have already totaled over $300 per machine.

Barry Mounts Can Boost YOUR Profits, too.

Barry Survey Chart SB-756 shows how you can

Ask for FREE check chart

- *make machine layouts flexible*
- *reduce down-time during tool changes*
- *eliminate "in-line" maintenance*
- *avoid need for machine duplication*
- *gain higher operating speeds*
- *stop building-borne vibration*
- *cut down noise*
- *decrease rejects from precision tools*



Write now — and learn how you can gain these important savings.

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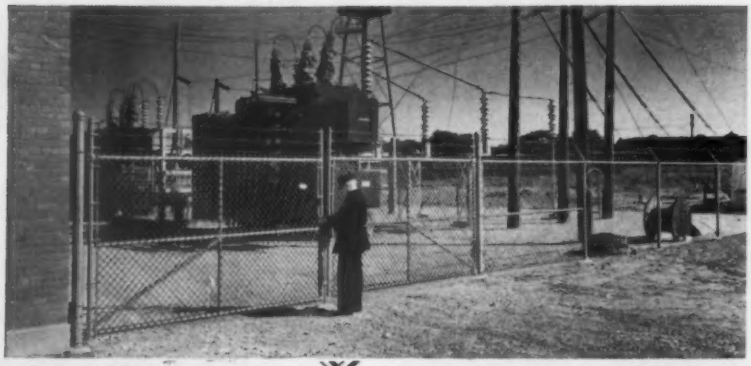
BARRY B MOUNT

SOLD THRU INDUSTRIAL DISTRIBUTORS

910 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

How to Get More for Your Fencing Dollars...

PAGE Offers the Widest Choice to Best Meet Your Needs!



PAGE chain link FENCE

America's First Wire Fence—since 1883

Your property protection should be and can be MORE than just a fence. It can be the RIGHT fence for you because you can make decisions from the widest variety of choices available anywhere. Every part of your fence will be quality controlled by PAGE from metal billet to the complete, erected fence.

You can choose from —

- 8 Fence Styles
- 8 Fence Heights
- 4 Fabric Metals
- 2 Types Metal Posts
- 6 Gate Styles, Many Widths
- Single or Double Barbed Wire Arms
- Top Rail or Top Wire

Important Advantages for You

PAGE pioneered in providing a wider choice of long-lasting fence fabric metals. Each of them possesses characteristics which meet individual preferences or make it more suitable to meet certain climatic or service conditions.

GALVANIZED STEEL • PAGE fabric of this class is woven of time-proved basic open-hearth steel wire, hot-dip galvanized after weaving to assure long, reliable service.

ALUMINIZED STEEL • By a PAGE patented process a coating of commercially pure aluminum is bonded to steel wire to provide longer corrosion resistance, yet its cost is comparable with fence fabric having shorter life expectancy.

ALUMINUM • Another material in the non-corrosive class. It will not rust nor will it discolor materially under unfavorable conditions. Because of the PAGE method of semi-flat weaving it has exceptional strength.

STAINLESS STEEL • This special chrome-nickel fence fabric is immune to practically all corrosive elements and is particularly advantageous near salt water and where the air is laden with smoke, sulphur or other factory emissions.

MANY STYLES — MANY VARIATIONS • Ready to meet your needs are 8 styles, varied by heights, gauges of fabric wire, units of supporting structure, types of gates (all with welded frames) and barbed wire strands for added security.

ALSO VERY IMPORTANT • The superior quality of materials and the specialized production skills represented by all PAGE FENCE parts are matched by the capable planning and expertness with which your fence will be erected. The Association member firm nearest you will confer with you on all details, offer sound recommendations and submit cost estimates without obligation. This localized firm has continuing interest in every fence it erects.

Write or send coupon for full information. With it we will send name of Association Member nearest you.

PAGE FENCE ASSOCIATION, Dept. PE, Monessen, Pa.
Please send me detailed information on PAGE CHAIN LINK FENCE

NAME_____

POSITION_____

COMPANY_____

CITY, ZONE & STATE_____

A PRODUCT OF PAGE STEEL & WIRE DIVISION, AMERICAN CHAIN & CABLE CO., INC.

For more facts circle 641 on Reply Card

NEW PRODUCTS

(Begins on page 186)

load ends are under compression, while the other three are idling. Thus, the cushion can be reversed for double service life. Standard cushion material is an oil-resistant, resilient Buna-N-compound. Also available are oak tanned leather for severe loads where resilience can be sacrificed; Bakelite for use where backlash and/or shock loads are not a factor; and Bakelite with Buna-N center for heavy loads and reduction of backlash at slow speeds. Ratings range from 0.4 hp at 100 rpm to 4.6 hp at 3600 rpm, using standard cushions. The coupling is 2½ in. long overall, 2⅛ in. OD. Lovejoy Flexible Coupling Co.

49—ALUMINUM GRATING is durable, easily cleaned

Rectangular Riveted (RR) Aluminum Grating is designed to retain combined advantages of a rectangular opening and

riveted gratings. It remains structurally rigid regardless of cutouts located in any part of the panel, says manufacturer; it is easily cleaned and offers greater durability under severe load conditions. There is a 79 per cent clear opening with this rectangular design—so that possibility of dirt, oil or scum accumulating in corners is claimed practically nil. Klemp Metal Grating Corp.

50—GEARMOTORS offer space saving advantage

This line of space-saving right-angle gearmotors with heavy load-carrying and shock absorbing qualities include 1- to 10-hp sizes for continuous-duty applications, 1- to 30-hp for intermittent duty. They are available with horizontal or vertical mountings, conventional double shaft, and hollow shaft. The one-piece reducer housing, heavily finned for

For more facts circle 642 on Reply Card →

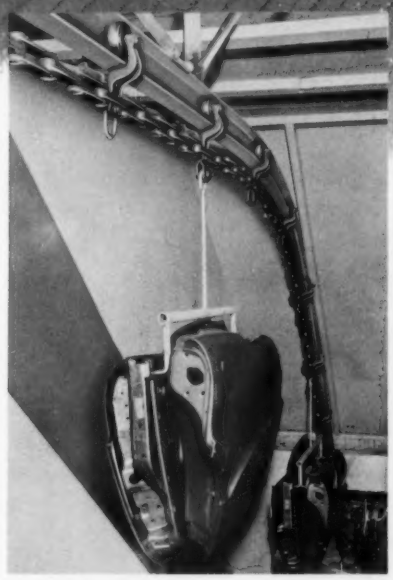
Conveyors Modernize Production Flow...

DOUBLE

Station Wagon Volume

The Ionia Manufacturing Company, Division of the Mitchell-Bentley Corp., Ionia, Michigan utilized more than 4½ miles of Webb conveyors in converting their five-floor plant into a "one-floor" assembly line. They manufacture station wagon bodies for two G.M. and one Ford Division. Forty-three Webb conveyors of four different types have transposed this plant into the acme of modern manufacturing . . . and doubled production volume.

The Jervis B. Webb Company manufactures all types of conveyors for automatic handling of any material from hairpins to raw steel. For more information on how Webb conveyors can improve your materials handling and reduce production costs, contact any Webb District Office or write direct.



The large illustration above shows a location on the third floor where a Webb Floor Type Conveyor carrying station wagon bodies is joined by a Webb Trolley Conveyor handling seat assemblies and other interior parts.

The photograph above is another view of the Trolley Conveyor coming up from the second floor . . . this time loaded with sub-assemblies for the storage area.

More details on reverse side

JERVIS B. WEBB COMPANY

SPECIALISTS IN CUSTOM CONVEYOR SYSTEMS

8933 ALPINE AVENUE • DETROIT 4, MICHIGAN

FACTORIES: DETROIT • LOS ANGELES • ATLANTA • HAMILTON, ONTARIO, CANADA • ENGLAND • FRANCE • BELGIUM • AUSTRALIA

Conveyors Modernize Production Flow... DOUBLE Station Wagon Volume

Stampings are carried to third floor from railroad receiving dock by a Webb 6" overhead trolley conveyor (1) bisecting the building. Parts go into storage (2) for controlled feeding to conveyor system. Trolley Conveyor (3) with carriers coded for scheduled parts are loaded from storage by stock handlers. In production area, small parts are removed and placed in fixtures (4) and welded into sub-assemblies. The same conveyor carries sub-assemblies to side panel assembly power and free conveyor (5) where complete side panel assemblies are welded. They are then transferred from these conveyors, placed on another trolley conveyor (6) and transported to fourth floor.

Here (7) side panel assemblies, roof tops and floor decks are positioned into body jig and gun welded. Bodies travel automatically through all phases of assembly and finishing . . . Bonderizing (8), prime (9), bake (10), wet sand (11), 1st finish coat (12), 2nd finish coat (13), polish (14) . . . On the third floor, hardware (15) and interiors are installed (16). After final inspection (17) a Webb Floor Conveyor feeds bodies to a shipping area. Here eight storage lines hold four complete truck loads ready for shipment. At this point a Webb automatic positioning body elevator loads haulaway trucks in minutes, completing the production cycle.

Ionia Manufacturing Company has good reason to be proud of their plant. With efficient conveyorizing, they have solved almost insurmountable production problems. Webb engineers, working with Ionia plant engineers, created a well organized, coordinated production flow.

JERVIS B. WEBB COMPANY

SPECIALISTS IN CUSTOM CONVEYOR SYSTEMS

DETROIT 4, MICHIGAN

IF YOUR PROBLEM IS MODERNIZING PRODUCTION FLOW . . . CALL IN A WEBB ENGINEER

CUT YOUR PRODUCTION COSTS

with

JOHNSON

Pneumatic Control

Johnson Pneumatic Damper Operators control the supply of outdoor air in a central ventilation system.

More and more progressive industrial firms are discovering that providing proper ventilation and comfortable temperatures is an excellent way to reduce costs. Workers automatically respond to comfort by improving production, stepping up efficiency. Absences fall off. So does turnover.

But, even the best, most efficient heating, cooling and ventilating equipment can't produce these conditions without the proper control. That's where a system of Johnson Pneumatic Control can be a big help to you.

Johnson Pneumatic Control does the job you expect because every Johnson System, regardless of its size, is designed and installed to meet the exact needs of the individual plant. *All* phases of the control work—design, installation and service—are handled by Johnson's own engineers and factory-trained mechanics.

Whether your particular control problems involve comfort conditions or the provision of protective temperatures and humidities for products and processes, Johnson Pneumatic Control is the answer. It's simpler by far than any other method of control—requires fewer components, is easier to operate and maintain, offers the widest choice of operating features.

Why not get started now in adding to your productive efficiency and cutting your operating costs? An engineer from a nearby Johnson branch will gladly make recommendations on any temperature, humidity or pressure control problem without obligation. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON CONTROL

SINCE 1885

PLANNING • MANUFACTURING • INSTALLING

T-900
Master Thermostat

T-901
Submaster Thermostat

V-103
Globe Valve

R-1051
Static Pressure Regulator

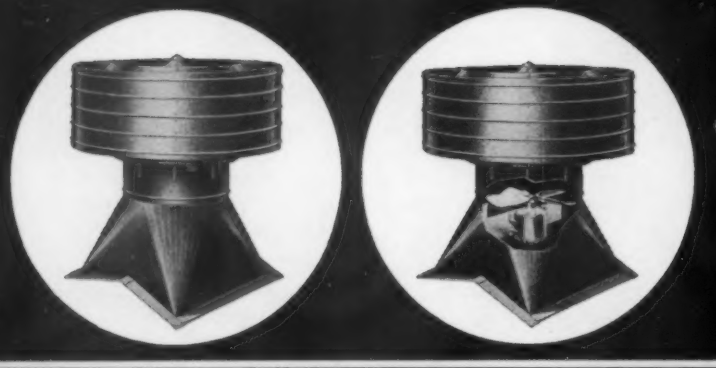
T-800
Remote Bulb Thermostat

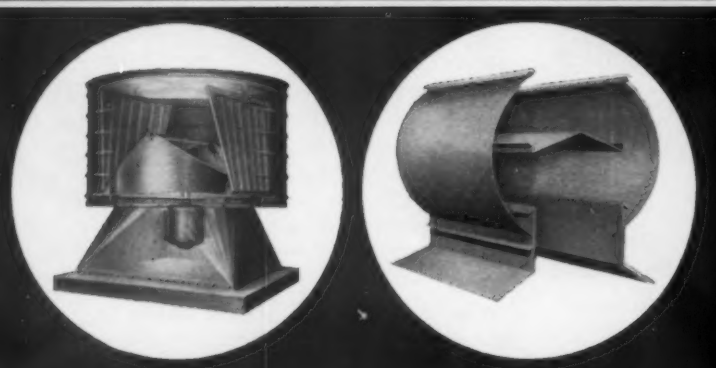
For more facts circle 643 on Reply Card

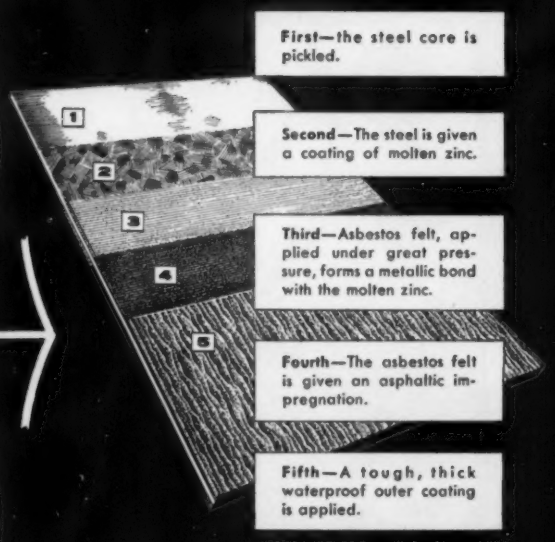
An Unbeatable Combination

ROBERTSON VENTILATORS made from ROBERTSON GALBESTOS

You will design years of maintenance free service life into your buildings by using either round or ridge type Robertson Ventilators made of Galbestos. Ventilators are potentially the points of greatest concern in a building because of their exposure to corrosion from outside and from within and the difficulty of keeping them painted. Robertson Galbestos Ventilators require no painting, and will last as long as the roof and walls—*where Robertson has long been the world's standard.* The use of Galbestos in their manufacture enables Robertson Ventilators to withstand extreme weather and highly corrosive industrial fumes over long periods without maintenance.






First—the steel core is pickled.
1
Second—The steel is given a coating of molten zinc.
2
Third—Asbestos felt, applied under great pressure, forms a metallic bond with the molten zinc.
3
4
Fourth—The asbestos felt is given an asphaltic impregnation.
5
Fifth—A tough, thick waterproof outer coating is applied.

There is no substitute for the complete protection that Galbestos can give.

ROBERTSON GALBESTOS Ventilators

H. H. ROBERTSON COMPANY

2419 Farmers Bank Building, Pittsburgh 22, Pa.

In England—Robertson Thain Ltd., Ellesmere Port, Cheshire
In Canada—Robertson-Irwin Ltd., Hamilton, Ontario

As shown in the cutaway illustration above, Galbestos employs a unique means of bonding the multiple coatings to the metal core. This exclusive method of manufacture produces a tough, corrosion-resistant and weather-resistant roofing and siding material which provides long service life without maintenance of any kind. You get complete protection—lasting protection and efficient ventilation—when you specify Robertson Ventilators made of Galbestos.

The economical value of Robertson Ventilators lies not only in their long range qualities of durability and maintenance freedom, but also in their exclusive design and construction features. When they are installed according to a Robertson Engineered Ventilation Recommendation, you will obtain efficient ventilation with the fewest number of units . . . resulting in lower cost. For complete details and engineering assistance, send in the coupon.

Please send information on Robertson Ventilators.

NAME_____

COMPANY_____

ADDRESS_____

For more facts circle 644 on Reply Card

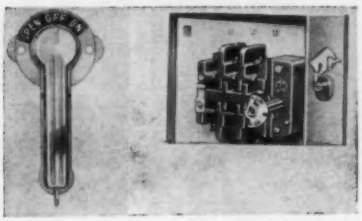
(Begins on page 186)

strength and thermal properties, contains a pair of helical gears for the primary reduction and a double-enveloping worm gear set for the secondary reduction.

This double-enveloping feature means that the worm shaft and gear wheel teeth are concave to give constant double-throated contact over a 45 deg sector of the gear wheel, manufacturer points out, and this means smaller gears producing the necessary ratings, resulting in savings in space and weight. This double-reduction gearing arrangement is also designed to produce lower output speeds at higher efficiencies. The gearmotors can be supplied with an a-c or d-c motor of any speed or duty rating, and any standard type of enclosure. Reliance Electric and Engineering Co.

51—DOOR DISCONNECT offers increased safety

An improved Type RAD Door Disconnect is announced as offering greater safety, plus easier and faster installation and maintenance. Among safety features are visible contacts, a self locating handle and a line cover. With contacts visible at all times when the door is open, the operator can see whether the panel is electrically live or dead. The self-locating



handle has an indicating line pointing to the operation location and the "on," "off," and "open," positions stand out against a red background. A safety "off" feature is a locking ratchet designed to prevent accidental opening of the door—you have to turn the handle to the "open" position before you can open the door. Also, the line cover has holes through which test prods can be inserted to determine that the running line is dead.

Easier installation is attributed to both 30- and 60-amp sizes having identical mounting dimensions; mounting holes for both sizes are standardized. Mounting of handle mechanism requires only three small holes and two screws. An adjustable operating shaft comes in three sizes, each adaptable within a range of 3½ in. Contributing to low maintenance are rugged, butt-type silver cadmium contacts. Arrow-Hart & Hegeman Electric Co.

52—FEEDWATER HEATER has pumps mounted on base

This packaged feedwater heater unit includes boiler feed pumps and elevated heater mounted on a single base and ready to hook up. Hookup consists only

clear the
air for
production
Dust produced by grinding, chipping
and similar operations is removed as created
by down draft dust control systems,
pioneered by Kirk & Blum.
Whatever your problem in industrial
dust control, call on Kirk & Blum, an organization
of engineers and mechanics with 50 years'
experience in this specialized field.
Write for complete information.
The Kirk & Blum Manufacturing Co.,
3189 Forrer Street, Cincinnati 9, Ohio
KIRK & BLUM
DOWN DRAFT
DUST CONTROL
For more facts circle 645 on Reply Card

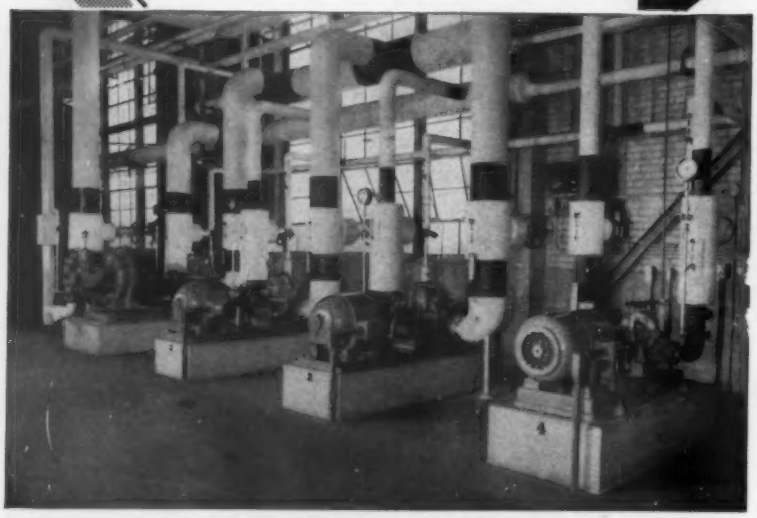
dependable

. . . or else!

Boiler Feed Pumps, like these four Warren Pumps shown at the new, ultra-modern North Grafton, Massachusetts, Heavy Press Forging plant of

WYMAN GORDON COMPANY

must always be available for round-the-clock operation—if and when necessary.



Photograph, courtesy Wyman Gordon Company. Other Warren Pumps in this plant include Condensate and Fuel Oil Transfer.

These experience-rated Warren Pumps, and thousands of others in the power plants of important and vital industries, are built with substantial plus factors as to dependability, low maintenance and economy.

BOILER FEED
CONDENSATE
FUEL OIL BURNER
OIL TRANSFER SERVICE

. . . there are types and sizes of Warren Pumps that will meet your requirements and live up to their reputation for dependability, minimum maintenance, economical operation and long life.

WARREN

SEND FOR FREE BULLETINS

P-33

WARREN PUMPS, INC. WARREN MASSACHUSETTS

For more facts circle 646 on Reply Card

NEW PRODUCTS

(Begins on page 186)

of connecting three lines—feedwater inlet, steam inlet and outlet for feedwater to the boiler. Unit is designed to provide completely automatic boiler feedwater control, supplying boilers with preheated, non-corrosive feedwater as required. It is built in four sizes, with a capacity of 4,500 to 19,500 lb of feedwater per hr, for boilers in the 200 to 600 hp range. It is available with single or duplex feed pumps. The smallest unit requires floor space of only 14 sq ft. Operation is at 30 lb pressure to provide feedwater temperature of 270 F. Bulletin 117-A gives details. Stickle Steam Specialties Co.

53—LIGHTING FIXTURE for grain elevators

This portable, dust-tight lighting fixture is for illuminating the interiors of grain storage silos. Announced UL approved for use in Class II Group G hazardous areas (flour, starch, or grain dust), this

cast aluminum fixture is a floodlight mounted on a triangular, caster-equipped steel dolly. The dolly will span a 33-in. diam bin manhole. Equipped with a hinged door, the floodlight contains a medium screw base receptacle, polished Alzak reflector, heat resistant lens, and accommodates a 250-w G bulb lamp. So that the lamp operates in the position recommended for G bulbs—between base-down and horizontal—the lamp receptacle is located in the bottom of the housing. Crouse-Hinds Co.

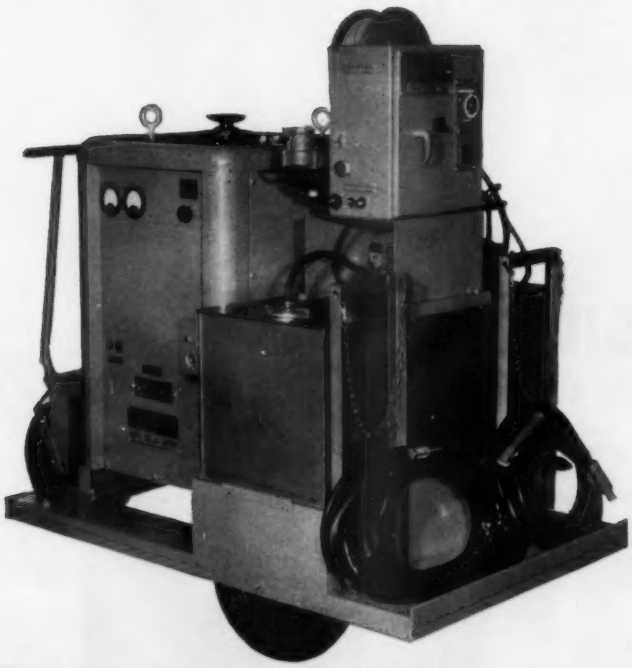
54—DUST SEPARATOR is high efficiency unit

The HV is announced as a low cost, high efficiency centrifugal dust separator. It is completely welded and made of heavy gage black iron (stainless steel units may be had if required). The path of the dust laden air traveling through the HV encounters a minimum of turbulence due to the scroll inlet and airfoil design inlet vane, it is explained, and a steep, smooth cone assures uniform and quick delivery of dust to the outlet. These factors are said to result in an improved cyclonic dust collector with low resistance requiring less fan power.

Initial cost of the HV Separator is reported lower than many cyclones of lighter construction. Manufacturer states that this heavier gage unit will give longer service and that it has wide appli-

AUTOMATIC WELDING ON WHEELS

New, Westinghouse PORT-ARC



All the Speed and Economy of Automatic Welding!
All the Portability with Ease of Any Hand-Welding Machine!

PORT-ARC . . . the most *versatile*, inert or CO_2 gas welding machine ever designed! Complete automatic welding, quickly wheeled into position for production runs! Or, efficient hand welding, "*anywhere*", for emergency repairs, maintenance, countless applications!

The PORT-ARC is complete, with its own constant potential (RCP) direct-current rectifier arc welder. This model SA-30P is particularly well suited for semi-automatic, full automatic and for plug or tack welding. Yet, it is easily portable, on its own lightweight carriage, for virtually *any* "on-the-spot" application!

PORT-ARC is extremely easy to use. *Everything* is automatic! From feeding electrode wire into the arc at a constant rate, to controlling the flow of shielding gas and the gun-cooling water.

It produces welds of excellent physical properties and appearance, with MS-20 wire, at high burn-off rates; utilizing only a minimum of argon shielding gas. Or, PORT-ARC also employs the exceptional Westinghouse MS-21 wire and CO_2.

Three specially designed, water-cooled nozzles—with an adapter for easy attachment—are available for plug or tack welding on flat surface applications, inside corner welds, or outside corner welds. J-22086

POWER-UP with Westinghouse welding equipment

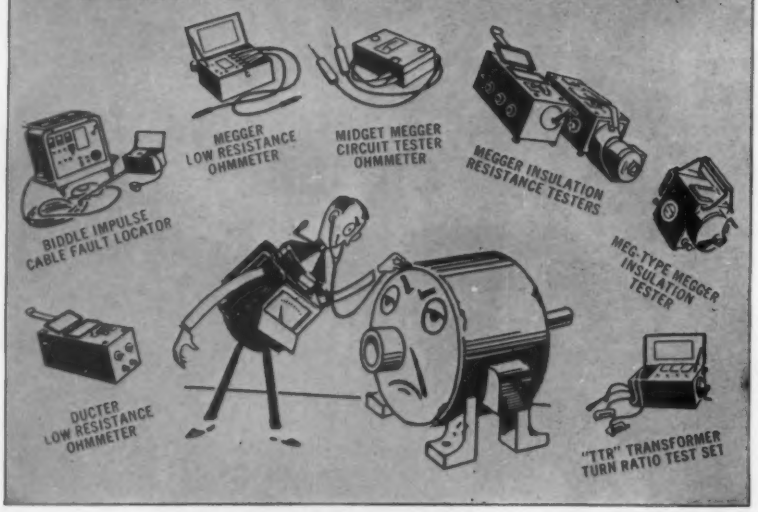
Only Westinghouse offers such welding leadership!

Get complete PORT-ARC information from your Westinghouse welding distributor. Or, write Westinghouse Electric Corporation, Welding Department, P. O. Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE... IF IT'S Westinghouse

For more facts circle 647 on Reply Card

FOR PRODUCTIVE MAINTENANCE DURING PLANT SHUTDOWN


MEGGER LOW RESISTANCE OHMMETER
MIDGET MEGGER CIRCUIT TESTER OHMMETER
MEGGER INSULATION RESISTANCE TESTERS
BIDDLE IMPULSE CABLE FAULT LOCATOR
MEG-TYPE MEGGER INSULATION TESTER
DUCTER LOW RESISTANCE OHMMETER
"TTR" TRANSFORMER TURN RATIO TEST SET

USE BIDDLE INSTRUMENTS FOR ELECTRICAL TESTS

More and more plants are adopting the policy of a complete shutdown for summer vacations. Where possible, it surely pays off, because machines get "tired" too . . . and preventive maintenance can make them well before they get sick. Especially if (in the case of electrical equipment) you use

MEGGER® INSULATION RESISTANCE TESTERS

. . . or any other testing instruments in Biddle's full line of equipment for the practical electrical man. Biddle's File "21" contains a selection of articles and check charts showing how preventive maintenance becomes productive maintenance by saving you thousands of dollars in "unscheduled" downtime costs.

WRITE for FILE 21-PL

MEGGER® GROUND TESTER, TOO . . .

is a vitally important instrument for summertime maintenance. Experience shows that ground resistance *does not remain constant* and tests should be made at least once a year to discover high ground resistance and correct it before lightning strikes. Biddle File "25" gives you a lot of "know-how" to head off costly damage from electrical storms.

WRITE for FILE 25-PL

B-709

JAMES G. BIDDLE CO.

Electrical Testing Instruments • Speed Measuring Instruments
Laboratory & Scientific Equipment
1316 ARCH STREET, PHILADELPHIA 7, PA.

For more facts circle 648 on Reply Card

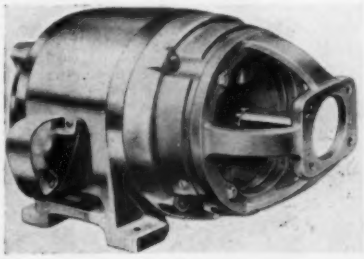
NEW PRODUCTS

(Begins on page 186)

cation—its design being suited for handling of fibrous, granular, abrasive, fine or coarse dusts at normal or high temperatures. It can be used on pressure or vacuum. Twenty standard sizes are available. Grouping of sizes can be had for handling air volumes from 150 cfm up. Bulletin 576 gives data. The Day Co.

55—PUMP MOTORS offer improved coupling method

Designed for hydraulic pumps, these motors are available in dripproof, totally-enclosed, and explosion-proof designs, and incorporate a face type registered bracket for mounting pump on motor. This method of coupling is said to present many advantages: separate base plates



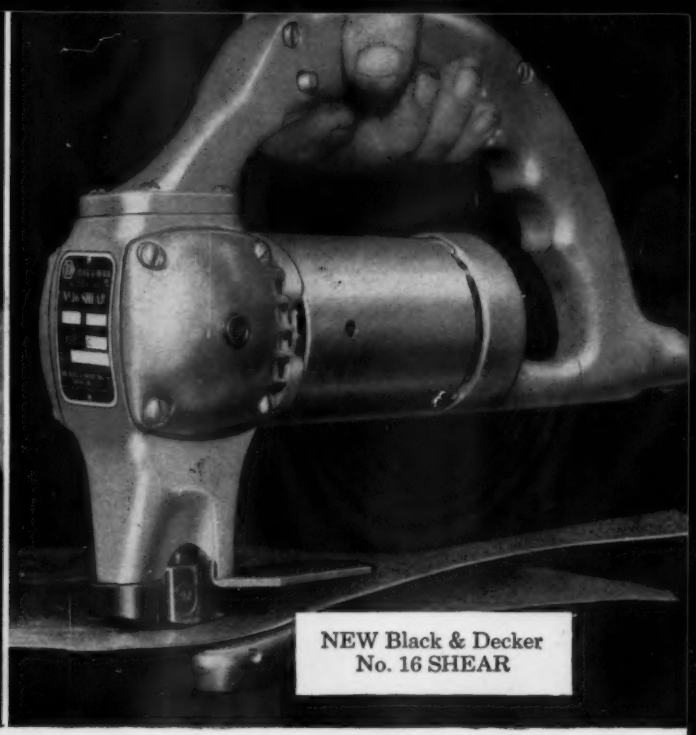
or mounting platforms are not required; a shorter, more compact package is achieved; built-in alignment of pump to motor is provided; and installation time is reduced. Bracket design permits easy access to motor shaft, coupling, and pump mounting bolts.

In the dripproof enclosure, Type H motors are available to 20 hp and Type SC to 125 hp. Totally-enclosed and explosion-proof designs are available in Type J and E to 10 hp, and in Type SD and SE to 125 hp. For double-end pump installations where low pressure-high volume and high pressure-low volume pumping is required, pump motor can be supplied with double end shafts and mounting brackets for supporting two pumps. Data Sheets, Sec. 245 give more details. U. S. Electrical Motors Inc.

56—COATING protects against weather, chemicals

Maintz is announced as a coating offering excellent protection against severe chemical and weather exposure. Manufacturer says it is based on du Pont's chlorosulfonated polyethylene which, in combination with silicone and other resins, produces a tough, resilient and long lasting coating with exceptional abrasion resistance. It is claimed to have sufficient elasticity to stand extremes of expansion or contraction without cracking and to retain this property at temperatures down to –40F. Maintz is chemically inert, company adds, and is resistant to ozone, and to many acids, alkalis, alcohols, ethers, refrigerants, greases, solvents. Suggested for protection of both buildings and equip-

NEW Black & Decker
No. 16 NIBBLER



NEW Black & Decker
No. 16 SHEAR

Two New B&D Tools speed up sheet metal jobs!

Faster, lighter, easier handling, POWER-BUILT and packed with features

Whether you need the speed of shears or the more precise performance of nibblers—you'll find a lot to like in the new Black & Decker No. 16 Shear and No. 16 Nibbler.

By actual test, they're faster and longer-lived than competitive tools. Their lighter weight means easier handling. Their centrifugal fans give cooler running. Each has exclusive construction features to stand up under the shock of sheet metal cutting.

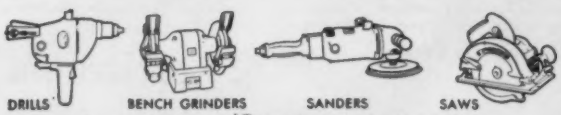
Try these new tools at your nearby Black & Decker distributor. There's a No. 12 Shear, too, for heavier work. For full details on new features, write to: THE BLACK & DECKER MFG. CO., Dept. 0805, Towson 4, Maryland. (In Canada: 80-86 Fleet Street, E., Toronto 2, Ontario.)

Look Under "TOOLS-ELECTRIC" in "Yellow Pages"

Leading Distributors Everywhere Sell

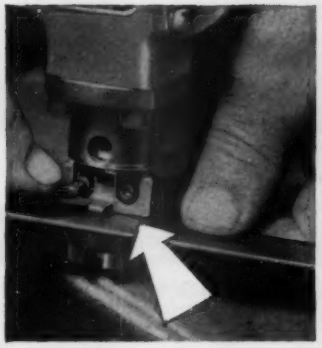
B&D Black & Decker®

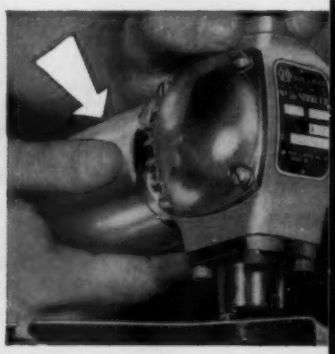
Portable Electric Tools—Power-Built to set the pace



DRILLS BENCH GRINDERS SANDERS SAWS

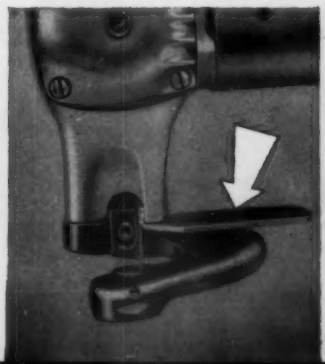
For more facts circle 649 on Reply Card

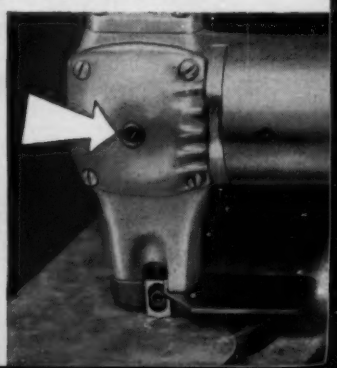




UP TO 3 TIMES FASTER than competition, new B&D Nibbler has twice the life, 20-30% less weight, reversible punch. Adjustable stripper plate (left), smaller diameter (right) are extra features.

50% FASTER than competition, new B&D Shear has one-third less weight than closest competitor, lasts much longer. Deflector plate prevents curling of material. Adjusting screw allows quick positioning of blade.





Why tough-service drive and conveyor jobs demand LINK-BELT roller chain

RESISTANCE TO TENSILE STRESS is achieved with properly heat-treated, accurately machined side bars made of premium steel and fitted with properly hardened pins, bushings, rollers.

STRENGTH OF CHAIN IN MOTION results from such refinements as pitch-hole preparation, micro-finish of parts, special processing of side bars, pre-lubrication, rigid quality control.

THE *greater dynamic strength* found in Link-Belt precision steel roller chain is essential for long life on today's harder-working drives and conveyors. This added capacity to resist shock loads, centrifugal loads and similar stresses is achieved only because Link-Belt adds refinements in manufacture.

These include lock-type bushings, shot-peened rollers, pre-stressing, closer heat-treat control. The result: a precision chain that takes stresses in stride . . . provides smoother, more efficient performance that measurably outlasts ordinary roller chain — reduces costs.

For full data on Link-Belt roller chain, see your Link-Belt office or authorized stock-carrying distributor.

LINK-BELT

ROLLER CHAIN & SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.472

For more facts circle 650 on Reply Card

(Begins on page 186)

ment where severe conditions are present, Maintz comes in white, black and gray, and can be supplied custom tinted in colors. It costs around $8.00 a gallon. A folder gives detailed data on corrosion resistance, method of application. West Chester Chemical Co.

Use the Reader Service Cards provided on pages 263-264 to ask for more information on these products. Circle item numbers of products in which you are interested.

57—SUMP PUMP resists corrosion; is portable unit

This self-contained portable sump pump has application in removal of sewage sludge, chemicals, oil, or clean or dirty water from sumps, wells, excavations and similar areas. Body, impeller, and strainer are bronze, to resist corrosion and assure spark-free operation. As a result, chemical solutions and inflammable or explosive liquids can be handled safely, manufacturer states. Heavy-duty thrust and radial bearings support the two-part impeller, mounted on a stainless steel shaft. Bearings are double sealed to protect them and the air motor from contamination by dirt or corrosive liquids.

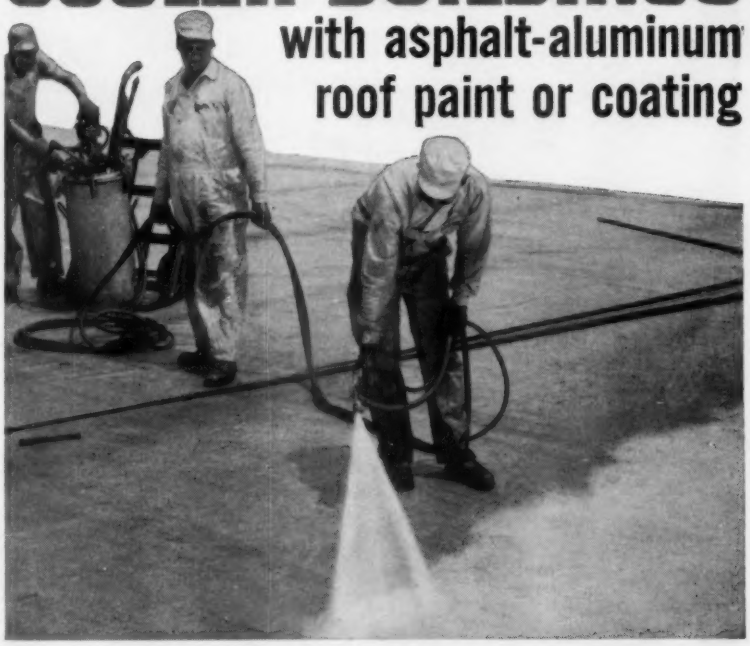
Requiring no priming, the pump is ready for use. It is less than 20 in. high and can be passed through a hole only 9 by 11 in. Liquid over 1⅜ in. deep can be picked up; solids over ¾ in. are blocked out by the integral strainer. Pump speeds vary from 3200 to 3600 rpm, depending on head against which it is pumping and the supplied air pressure. A built-in governor serves to prevent excessive speed. Schramm, Inc.

58—VENTILATORS for use in corrosive atmospheres

Fabricated polyethylene ventilators and exhaust systems are announced by this manufacturer, with 6, 8, 10 and 12-in. diam inlet size ventilators in stock at present. Ventilators are designed to handle static pressures from ⅛ in. to 4 in., and move from 100 cfm of air to 3400 cfm, depending on size used. The

TOUGHER ROOFS... COOLER BUILDINGS

with asphalt-aluminum roof paint or coating



You add years to the life of your plant roofs, reduce costly maintenance, when you coat them with an asphalt-aluminum roof paint or coating. Put on a tough, weather resistant aluminum shield that blocks damaging moisture, reflects the sun's heat.

A bright aluminum coating on the roof can keep a building as much as 15° cooler in the summer.

Guard your roof against weather, cut roof upkeep and air conditioning costs with an asphalt-aluminum paint or coating made with Reynolds Aluminum Pigment. Look for the Warranty Seal—it means at least two pounds of pure aluminum pigment per gallon, and an approved vehicle.

If you employ a contractor be sure he's reliable, and ask him to use aluminum roof paint or coating with Warranty Seal assurance.

Guard Against Rust, Corrosion with Aluminum Paint

Metals and masonry last longer, look better with less maintenance when coated with aluminum paint made with Reynolds Aluminum Pigment. Even one coat protects against rust and corrosion. Use it to give your plant the modern look of aluminum—inside and out.

By the makers of Reynolds Wrap

See "CIRCUS BOY", Reynolds exciting dramatic series, Sundays on NBC-TV

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

Reynolds Metals Company
P. O. Box 1800-PL, Louisville 1, Ky.
Please send me details on
☐ Aluminum Roof Coatings ☐ Aluminum Paints

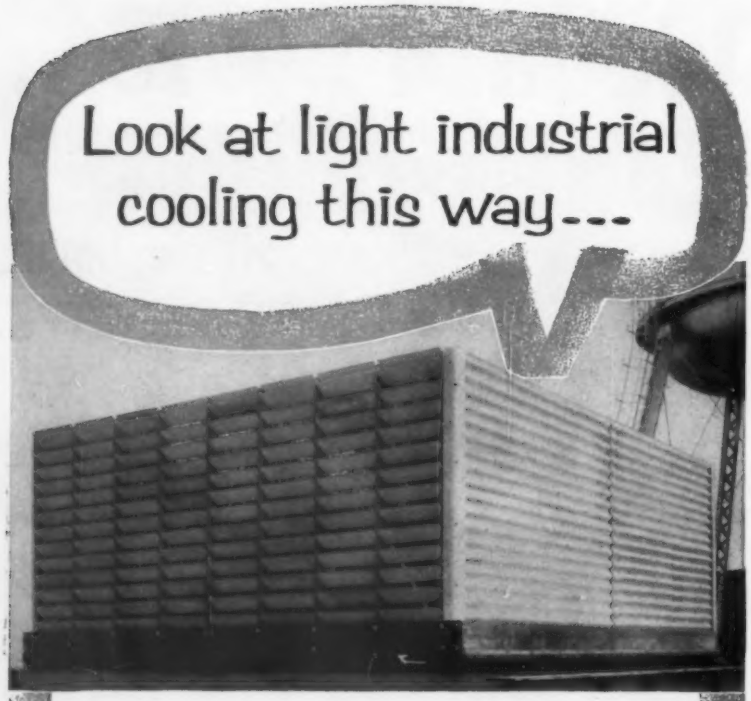
Name_____

Company_____

Address_____

City_____ Zone____ State_____

For more facts circle 651 on Reply Card



MARLEY

Double-Flow Aquatowers*

In many plants, between the giant industrial cooling tower and small packaged towers lies a broad range of cooling requirements that can best be described as "intermediate-capacity"—and this is the area in which Marley's Double-Flow Aquatower perfectly fills the bill.

The Double-Flow Aquatower adapts the complete Marley cross-flow method of water cooling to the intermediate field . . . without short-cuts. It conceals a mighty performance punch within its compact, attractive exterior, and gives you these plus-performance features engineered for huge Marley industrial towers:

Open Distribution	Extra-rugged structure
Marley filling	Marley drift eliminators
Marley fan cylinders	Marley industrial type fans
Marley Geareducers	Easy-access maintenance

All this — and more — is yours in a streamlined tower that requires minimum initial investment and minimum upkeep cost. But learn for yourself why the Double-Flow Aquatower is far-and-away industry's first choice for intermediate-capacity cooling—call the Marley sales engineer in your city or write . . .

*Trademark Reg. *U. S. Pat. No. 2776121

the Marley Company
Kansas City, Missouri

MARLEY

For more facts circle 652 on Reply Card

NEW PRODUCTS

(Begins on page 186)

ventilator housings as well as the rotors are completely constructed of polyethylene, it is stated; no metallic parts are exposed to the corrosive fumes and vapors that pass through ventilators. American Agile Corp.

59—PROTECTIVE COATING to prevent leaky roofs

Rooflex is announced as a protective coating for built-up and metal roofs; it is used as a patch or roof coater. Designed for quick permanent leak repairs, the material can even be applied while it rains, according to manufacturer. With the coating, no heat is necessary and it can be applied directly from the container. Formulated for industrial use, Rooflex is designed to withstand water, smog and chemical fumes. It is noted that retained oils, held under the quickly formed surface film, assure plasticity—the ability to move with expansion, contraction and structural sway—without losing adhesion, surface stability, or ability to give lasting protection. Flexrock Co.

60—BUCKET PUMP for any lube, in any weather

Featuring an Adjusto Lever which facilitates pumping of oil or grease in cold weather and at pressures of 2500 to 5000 lb, the Big A Portable Bucket Pump is

designed for fast fill and easy service. One wrench disassembles the entire unit. The pump is available in seven models for all types of lube fittings, and has a gasket sealed cover. A dynamic primer serves to assure constant delivery and a foot valve to provide full pressure at every stroke. Of oval design, the pump has a lubricant capacity of 35 lb. Alemite Div., Stewart-Warner Corp.

61—GRINDING WHEEL offers strength, safety

Safety Back is described as a new concept of flared cup wheel construction, offering great initial strength and a high degree of safety for the operator. Manufacturer says this wheel puts accident prevention where it is needed most—in original strength and breakage resistance. Steel covers the entire back and extends

SKYLINE ADVERTISING

. . . a *PLUS* value with HORTON ELEVATED TANKS

Dependable gravity pressure water storage is the primary function of a Horton® elevated tank. It provides a private water supply that is available day or night for fire protection and other needs. But here is a PLUS value—the use of these attractive tanks to promote your company name or a replica of your product. Towering above the surrounding area, this valuable "skyline" advertising is a constant reminder of your modern, progressive plant and its products.

Chicago Bridge & Iron Company has complete facilities to create elevated tanks of standard or unique design . . . structures that are functional as well as decorative to meet *your* requirements. Complete information on Horton elevated tanks may be obtained by writing our nearest office.

Left: 100,000-gal. Horton ellipsoidal-bottom elevated tank built for Universal Oil Products Company at Des Plaines, Ill.

Center: 75,000-gal. special elevated tank built for Gerber Products, Inc., at Rochester, N. Y.

Right: 100,000-gal. Horton Watersphere® built for the Rubatex Division of Great American Industries, Inc., at Bedford, Virginia.

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
New York • Philadelphia • Pittsburgh • Salt Lake City • San Francisco
Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

Snap-on*

MATCHES TOOL SETS TO YOUR SPECIFIC NEEDS

MECHANICS STANDARD SERVICE SET No. 5164GS-B

YOU can get a *Snap-on* tool set with the right kind of tools to fit your job needs exactly.

Snap-on assembles special tool sets for a wide range of industries including automotive, aviation, construction, mining, chemical, petroleum and railroad. Tools for each industry are chosen as a result of years of experience with users in each of these fields.

A complete set of the right, precision-made *Snap-on* tools saves hours of time — and puts an end to damage of parts caused by using loose-fitting makeshift tools. Each set fits neatly in a handsome, strongly-reinforced chest.

Write for your free catalog. Write today for your copy of the new *Snap-on* Catalog V, listing more than 4,000 hand and bench tools.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
8068-E 28th Avenue • Kenosha, Wisconsin

For more facts circle 654 on Reply Card

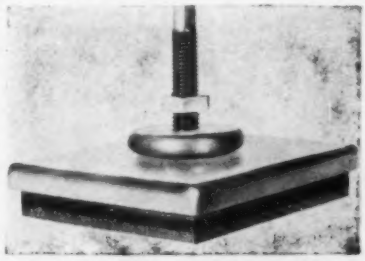
NEW PRODUCTS

(Begins on page 186)

down the side to add more reinforcement. The Safety Back is also said to aid in overcoming abusive wheel mounting and operating practices. The steel-backed threaded steel insert serves to provide convenient and secure mounting and to eliminate possibility of hub being pulled out. Ease of operation is also featured. It is pointed out that the Safety Back covers no more of the wheel than a revolving cup guard, so it cannot interfere with the operator's work and doesn't require constant adjustment. The Safety Back is disposable and manufacturer says no premium price is asked for this design. Bulletin 7157 covers it. Manhattan Rubber Div., Raybestos-Manhattan, Inc.

62—MACHINE MOUNT has self-leveling feature

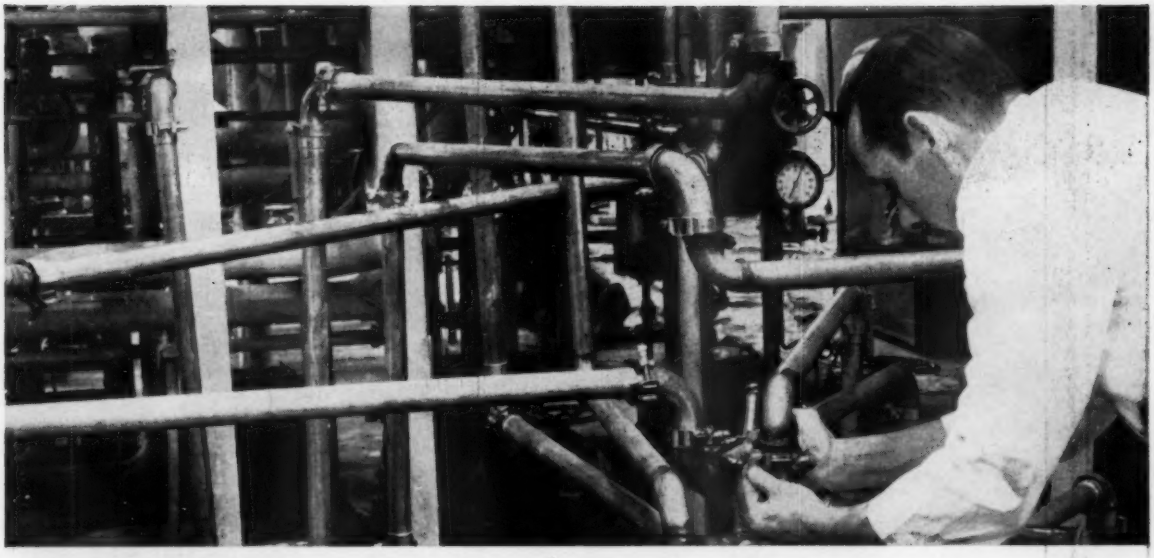
The Level-Rite consists of an all-steel base unit with leveling screw and leveling plate, combined with a vibration dampener pad. There are seven models with loading ranges from 800 to 7500 lb per unit, and four sizes from 4 by 4 in. to 10 by 10 in. One unit is required for each machine leg



or mounting point. Level-Rite is said to have two special features: a screw-post design by which a machine is quickly and easily leveled and new compression anchoring. Only action required is rotation of the square top of the screw post to bring machine to level position, then securing the lock nut. Once set, with Level-Rite, machines stay level without further adjustment, it is claimed. In anchoring, no bolts, lag screws or cement are required; the mount is designed so compression provides positive hold and there is no "walking" or creeping under tough side loads. The Felters Co.

63—LP CONVERSION KIT for gas powered trucks

An LP gas conversion kit bearing UL listing for "approval by report" of a field installation is announced for use on this manufacturer's lift trucks. It means, says company, that most gasoline models now in use may be converted to LP gas by user with a procedure and component parts which meet UL requirements for safety in operation. In addition, introduction of this kit gives local authorities a yardstick against which to judge safety of the application, it is noted.

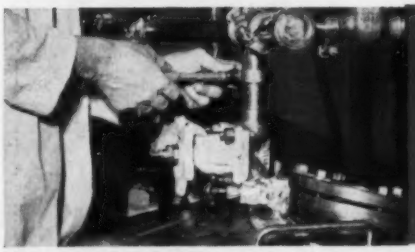


MARMAN V-Band Couplings Simplify Rerouting of Piping, Speed Disassembly for Cleaning

ON ELI LILLY AND COMPANY ANTIBIOTIC PROCESSING EQUIPMENT

Extensive use of Marman V-Band Couplings has simplified processing problems in the manufacture of antibiotics at Eli Lilly and Company. On stainless steel piping used to transfer batches of penicillin, stainless steel Marman Couplings permit quick disconnection for rerouting and frequent cleaning. On reconnection, the piping is tightly sealed to prevent contamination.

Marman V-Band Couplings offer many time-saving advantages for all kinds of industrial applications. They are available in a wide range of styles and sizes to meet your fastening and joining needs. Standard tube flanges are available from stock. Write today for full information and the name of your nearest Marman Distributor.



Eli Lilly personnel can dismantle piping quickly by removing the Marman V-Band Coupling.

Marman V-Band Coupling

Transfer lines are tightly sealed by the V-Band action of Marman Couplings.

MARMAN DIVISION
Aeroquip Corporation

11214 EXPOSITION BLVD., LOS ANGELES, CALIFORNIA

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO

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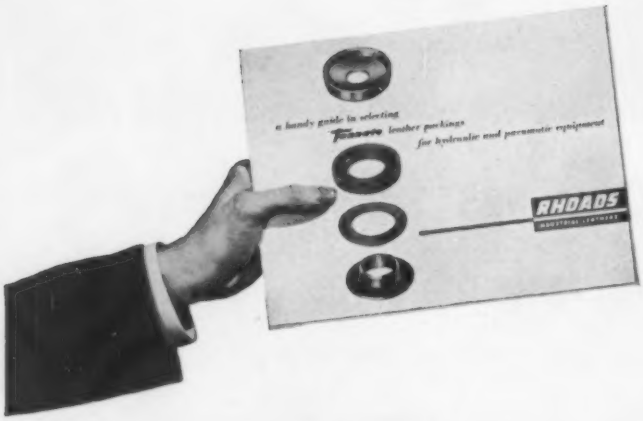

a handy guide in selecting leather packings for hydraulic and pneumatic equipment

This colorfully illustrated, clearly written eight page booklet tells you just where to use and how to select U, Vee, Cup or Flange Packings for hydraulic and pneumatic applications. J.I.C. sizes, standard nomenclature, dimensions, etc. enable you to order Packings quickly, easily and economically. Write on your business letterhead, to

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For more facts circle 656 on Reply Card

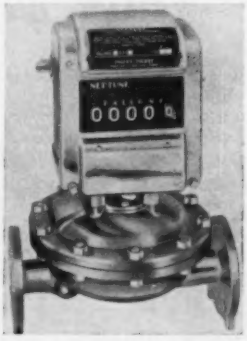
NEW PRODUCTS

(Begins on page 186)

Descriptive material on the kit is being distributed by Underwriters' Laboratories to interested local authorities, company points out, so they can evaluate use of a truck converted to LP gas after determining the degree of fire hazard under which it will be working. Each kit carries a serial number giving certification that the conversion, if applied according to proper procedure, has been accomplished in a manner meeting UL specifications. Kit components are a fuel tank, fuel filter, LP gas converter-regulator, carburetor, solenoid safety shut-off valve, static pressure relief valve and hoses and connections. The Yale & Towne Mfg. Co.

64—LIQUID METER is stainless steel for corrosive fluids

Based on company's positive displacement principle, with only one moving element exposed to liquid, this stainless steel meter is designed to enable close metered control over corrosive solutions and chemicals which must be kept pure.



Claimed virtually immune to chemical attack, the meter is said to maintain high accuracy over long periods of service in batch mixing and general process work.

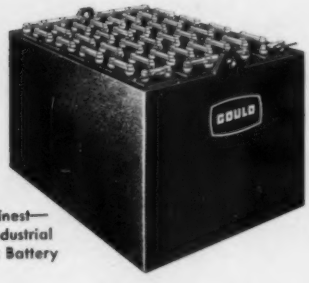
Meter casing and measuring chamber are Type 316 stainless steel. The gear train is mounted outside the meter casing and is isolated from the liquid. All wetted parts are either Type 316 stainless or special corrosion-resistant nonmetallic materials. Capacity of this 1½-in. meter ranges from 20 to 100 gpm for most liquids. It is available with a choice of direct-reading, ticket-printing, or Auto-Switch registers in which an electric switch is automatically actuated when a pre-determined quantity of liquid has been delivered. Neptune Meter Co.

65—DRY-TYPE TRANSFORMER is smaller, lighter

Type DT-3 is announced as a dry-type three-phase distribution transformer which features reduced weight and size, is quieter, and better looking. The unit uses inorganic insulation, basically silicone, and is designed for 150 C temperature rise. Over-all volume is 25 to 51

Pheasant hunting in Tacoma, Washington, where many champion field dogs are raised.

Set Your Sights on Longer Battery Life:



America's Finest—
Gould Industrial
Truck Battery

Here's a tip that may help you.

You can reduce battery costs, save your company money and be better able to judge the comparative value of each make of battery, if you simply keep good battery maintenance records. You will extend battery life by consulting these records frequently, thereby assuring the best possible operating procedures.

Why not talk this idea over with your local Gould representative . . . he will give you easy-to-use maintenance record charts. Gould-National Batteries, Inc., Trenton 7, N. J.

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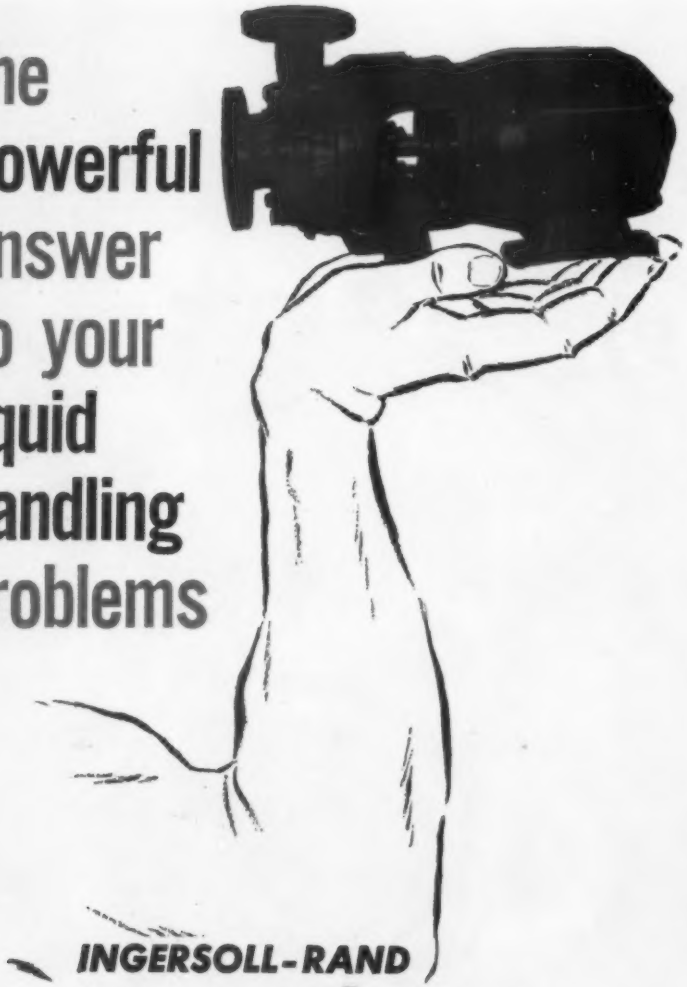
the powerful answer to your liquid handling problems



INGERSOLL-RAND

MOTORPUMP

When production lags because of inadequate pumping facilities, you need the dependable power of an Ingersoll-Rand Motorpump. These pumps are designed for deliveries of from 5 to 2800 gallons per minute, they operate in any position and being compact, save floor space as well!

I-R Motorpumps are efficiently designed for economical performance and ruggedly constructed to stay on the job with a minimum of maintenance.

To get all the details on I-R Motorpumps in sizes from ¼ to 75 hp, write for complete catalog data.

Ingersoll-Rand

9-421 11 Broadway, New York 4, N. Y.

For more facts circle 658 on Reply Card

NEW PRODUCTS

(Begins on page 186)

per cent less than company's previous Class B, 80 C design. Weight reductions range from 17 to 32 per cent, and sound levels are said to be substantially lower. Mechanically-isolated core and coils are utilized to reduce transmission of noise, permitting connection of rigid conduit to case without causing noise transmission throughout conduit and mounting equipment. Terminal boards and connections are in a compartment in bottom of transformer where low-temperature conductors can be used, since air in this area is at ambient temperature. The units, in either 600- or 2400-v class, are available in ratings from 45 through 300 kva. Westinghouse Electric Corp.

66—BRAKES are designed to hold load if power fails

Essentially two brakes in one, Power-Safe Brakes are designed to combine high torque and fast cycling with ability to hold or stop a load if power fails. Power torque ratings range from 125 to 650 ft-lb and fail-safe torque ratings from 33 to 205 ft-lb. Simplicity of operation is announced as an outstanding characteristic

of the Power-Safe line. The entire brake has a minimum number of moving parts with none of them in the fail-safe mechanism. There is no friction on the field or magnets so they never need replacing, company states—all that ever needs to be replaced is the face and the armature.

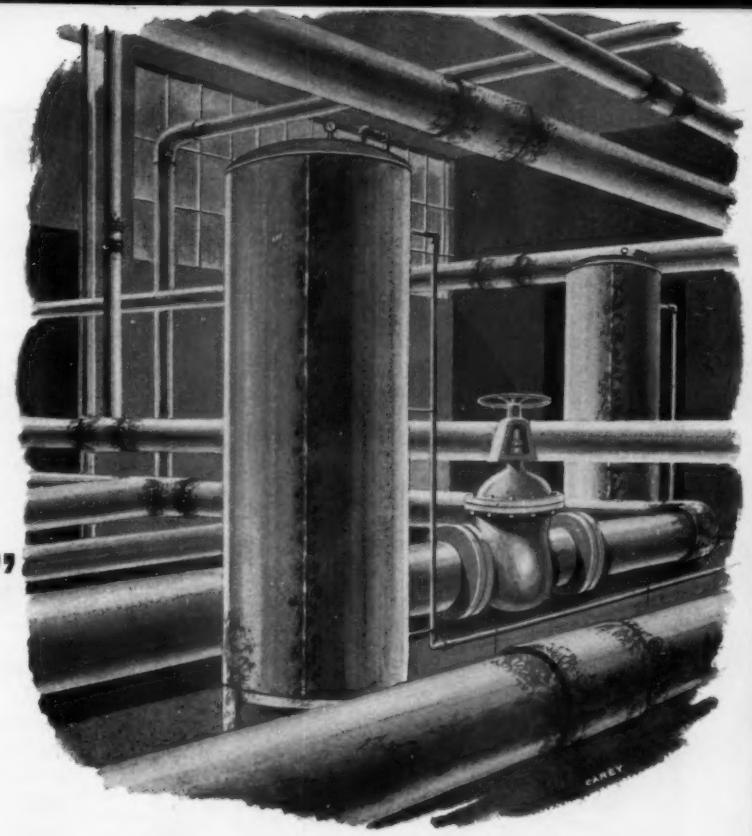
A major advantage in many installations is the compact design of these brakes. They are mounted with either inside bolt circle or outside mounting flange. With a special adapter, Power-Safe Brakes can be mounted to a NEMA C flange and used as a motor brake for a wide variety of machinery applications. Warner Electric Brake & Clutch Co.

67—ALIGNER for the vapor proof fixtures

The Type VPFH Fixture Aligner is offered for use with company's Type VG Series of junction boxes. Through the use of a Neoprene cushion, the fixture aligns itself as a result of its own weight, it is explained, and this Neoprene feature also helps absorb vibration and shock.

Protective coating failures usually begin with

"TROUBLE SPOTS"



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Severe corrosion problems solved with COPON include...

- Internal or external protection of pipes, tanks and vessels from solvents such as Aliphatic or Aromatic Hydrocarbons, Ketones, Esters and Alcohols.
- External protection of pipes, tanks and structures from heat, high humidity and chemical fumes.
- Protection of cooling tower headers, air washers and heat exchangers.
- Protection of production equipment from the severe corrosive action of cutting coolants.

COPON coatings provide superior protection for seams, welds, sharp edges and other corrosion "trouble spots." They provide higher film build-up per coat and cling tenaciously to metals and alloys. They last longer, because Copon remains tough and elastic even when subjected to chemical fumes, heat and high humidity. And they are less likely to be mechanically damaged, because Copon offers greater abrasion resistance than most protective coatings.

Easily applied by brushing or spraying, there is a selection of Copon coatings designed to solve or prevent severe corrosion problems. They have been used successfully to protect offshore drilling rigs, internally coat new and used pipelines, stop corrosion losses in chemical plants and paper mills, and in many other installations where corrosion costs were skyrocketing.

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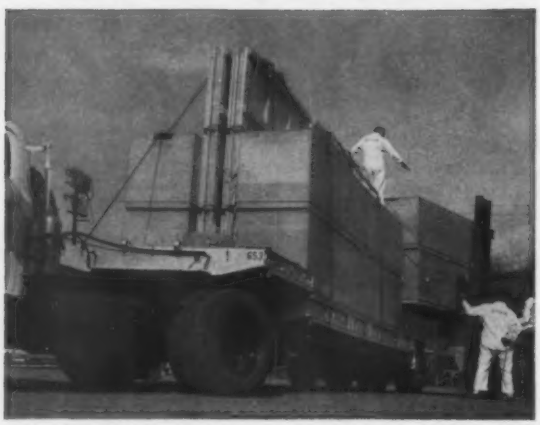
For more facts circle 659 on Reply Card

VERSATILE

Fir plywood, used as floor sections, helped Boeing Aircraft Company solve a scaffolding problem on their KC-135 jet tanker-transport tooling program. Standard plywood sizes are used; floor sections are designed to these dimensions and fabricated with rapid-assembly rail fittings. The standard size sections mean that scaffolding can be taken down and reassembled in whatever shape required by subsequent plane construction. Previously, each tooling required entirely new scaffold design.

DURABLE

Fir plywood is an ideal material for all types of tanks. The durability of overlaid Exterior-type fir plywood (made with 100% waterproof glue) is dramatically demonstrated by this use aboard a fishing boat. The salt-brine well holds 25,000 pounds of fish, was built to replace a metal refrigerated ice pack—at a saving of about 75%, including the cost of the compressor to keep the brine at 30°. Another advantage: no electrolysis problem, because of the wood construction.



LOW COST

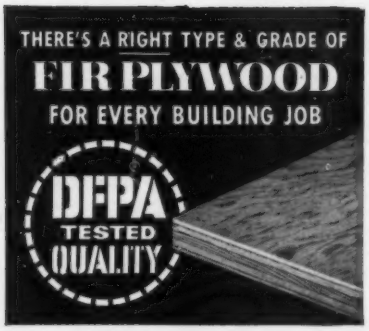
A 20% saving in material plus additional 40% reduction in time and labor costs was realized by Lyon Van & Storage Company's Export Division, Burbank, California, in the construction of fir plywood shipping containers. Shown are guided missile component crates, made with Exterior plywood: ⅜-inch on the sides, ½-inch on the top, 1-inch on the bottom. Motion picture cameras and aircraft instruments are other items shipped by Lyon in fir plywood containers.

DFPA TESTED QUALITY

FIR PLYWOOD

means quality construction

FOR MORE INFORMATION about uses shown above, design and/or specification data, mail coupon ⟶



1. SPECIFY BY DFPA QUALITY TRADEMARKS

DFPA grade-trademarks appear only on plywood manufactured, inspected and scientifically tested under the DFPA quality control program. DFPA, Douglas Fir Plywood Association, is a non-profit industry organization devoted to product research, promotion and quality maintenance.

2. CHOOSE THE RIGHT GRADE FOR EACH JOB

Fir plywood comes in two types: 1. *Exterior* (waterproof glue for permanent exposure to water or weather); 2. *Interior* (moisture-resistant glue) for indoor uses, crating, sheathing, maintenance. Within each type are several grades – i.e., panels with one good side, two good sides. Most popular grades are shown below.

EXT-DFPA — Exterior plywood for permanent outdoor uses

PLYPANEL — PlyPanel® for paneling, most indoor uses

PLYSCORD — PlyScord® is unsanded panel for sheathing, crating, bins, etc.

PLYFORM — PlyForm® concrete form grades come in Exterior and Interior types.

SPECIALTY PANELS include 1. *Overlaid Exterior plywood* (hard, smooth, abrasion-resistant fused resin-fiber surfaces) for siding, signs, tanks, concrete forms; 2. *Textured panels* with smart grooved, brushed or striated surfaces for fixtures, siding, special decorative effects.

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Wash. (Good USA Only) Dept. 179

☐ Please send basic fir plywood specification data.

☐ Also send information about use of fir plywood

for.....

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

For more facts circle 660 on Reply Card

NEW PRODUCTS

(Begins on page 186)

The fixture is designed to swing 25 deg in all directions; a screwdriver assembles it. Killark Electric Mfg. Co.

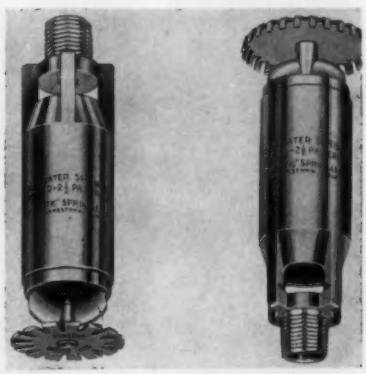
To receive product data circle item numbers on the handy Reader Service Cards provided on pages 263-264.

68—FINGER GUARD is seamless, cotton-lined plastic

Greater safety and freer finger movement are announced for this seamless finger guard. Especially suited to assembling, electrical spotting and handling small parts, the guards are made of high quality plastic, fully lined with snug-fitting, perspiration-absorbent cotton; in men's and women's sizes. Advance Glove Mfg. Co.

69—SPRINKLER HEADS for air foam-and-water spray

New designs for both and upright and pendent sprinkler head for use in combination air foam-and-water spray fire protection are announced. It is noted that the pendent head, previously not available for this use, permits adaptation of water sprinkler systems to the combination use in special hazard situations without repiping, even where space is limited between present piping and ceiling. In use, this combination system first discharges a large volume of thick foam to blanket surface fires, then produces water spray. Automatic Sprinkler Corp. of America.



70—POWER TROWELS are small, light in weight

Either of these two power trowels can be carried—or packed in the trunk of a car. The Kelley Bantam has a 24-in., trowel diameter, and weighs 75 lb. The Kelley Boy has a 29-in. trowel diameter, weighs 90 lb. Although small, they are reported to do an excellent job of floating and finishing concrete. They are suggested for work in small or confined areas, for maintenance and repair jobs. Four wide-sweep combination floating and finishing blades permit operator to float, level and finish. Blade pitch is readily changed during operation by the click-stop adjusting lever. Kelley Machine Div., Weisner-Rapp Co., Inc.

71—SOLDERING IRON for miniaturized circuitry

This soldering iron, weighing less than 1½ oz, is for production line soldering of sub-miniature equipment, printed circuits, and instruments. Very small connections can be soldered inside equipment with a minimum of heat loss or damage of adjacent wiring, insulation, and terminals, according to company. A tiny tubular heater, in the extreme tip of the iron, develops a tip temperature of 750 to 850 F. This design is said to provide rapid recovery under production conditions. The tip is vacuum processed iron, claimed highly resistant to harmful effects

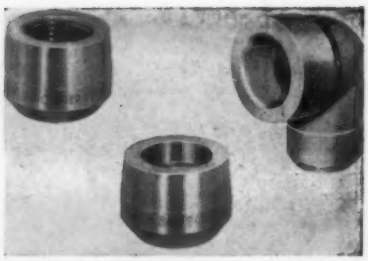
NEW PRODUCTS

(Begins on page 186)

of tin and high temperatures. The iron is rated 6 v, 12 w, is available with 6-v transformer integral with a 6-ft cordset, or with cordset and terminals less transformer. General Electric Co.

72—OUTLET FITTINGS are easily installed

W-S Couplets are easy-to-install branch outlet connections for pipelines, tanks and pressure vessels. The W-S Couplet was



designed to function as a universal outlet connection. On most applications the fittings are used without modification. Where attachment is to be made to a small diameter pipe, the fitting is modified by contouring the welding end with an acetylene torch to mate with the curvature of the pipe diameter. Couplets are made with extra length and heavier wall to permit contouring without detriment to strength of fitting, weld or end.

W-S Couplets come in sizes ¼ through 2 in. with screw-end or socket-welding end connections. They are also available in 90-deg elbows. They can be had in forged carbon steel (ASTM A-105, Grade 2), 3000-lb WOG class screw-end type and schedule 40-80 socket-welding type. Bulletin CP-1-57 gives data. W-S Fittings Div., H. K. Porter Co., Inc.

73—POWER TRANSFORMERS available in 34 types

In this multi-purpose line of standard power transformers are 34 types, including plate, combination, filament, filament isolation and line isolation transformers. It has initial IR values in excess of 100,000 megohms, as compared to 10,000 megohms minimum listed in the applicable military specifications. According to company, 80 per cent of the electronic power circuitry done today can be handled with the 34 types offered. The transformers are designed to operate on both 50 and 60 cycles, and users can obtain an almost unlimited combination of voltages. All units contain electrostatic and magnetic shielding. Transformer bracket, cover of can, and chassis mounting flanges are all one-tooled piece. Leak-proof construction is also announced. Sylvania Electric Products Inc.

74—BUILDING SIDING is wood fiber product

Insulite Primed Siding is said to look, feel and work like wood, yet have none of wood's disadvantages. The new wood fiber product is made from native Minnesota aspen. It has no structural or surface grain, no knots or slivers, says manufacturer, and it will not split or crack from nailing. Used as vertical or horizontal siding, it can be worked with ordinary wood-working tools. It cuts with both hand and power saws. It is furnished prime painted on all sides and edges and has a "weatherdrip" edge. The product is available for horizontal lap application, as vertically grooved siding, and siding without grooves. Minnesota and Ontario Paper Co.

Introducing...
the Roof Ventilator
"Twins"
Bell-Ex Centrifugal Roof Ventilator
VP-Ex Propeller-type Roof Ventilator
...economical
space-saving roof units to
simplify your ventilating problems
When roof ventilators provide the answer to your ventilating needs, select one of the nyb "Twins" for maximum dependability . . . and economy, too! The Bell-Ex will exhaust against high resistances effectively from hoods and duct work; the VP-Ex is a sturdy, flexible unit that may be used where resistances do not exceed ¼ inch static pressure. The "Twins" are completely weatherproof and corrosion-resistant, easily accessible for maintenance . . . and of modern design to complement any exterior.
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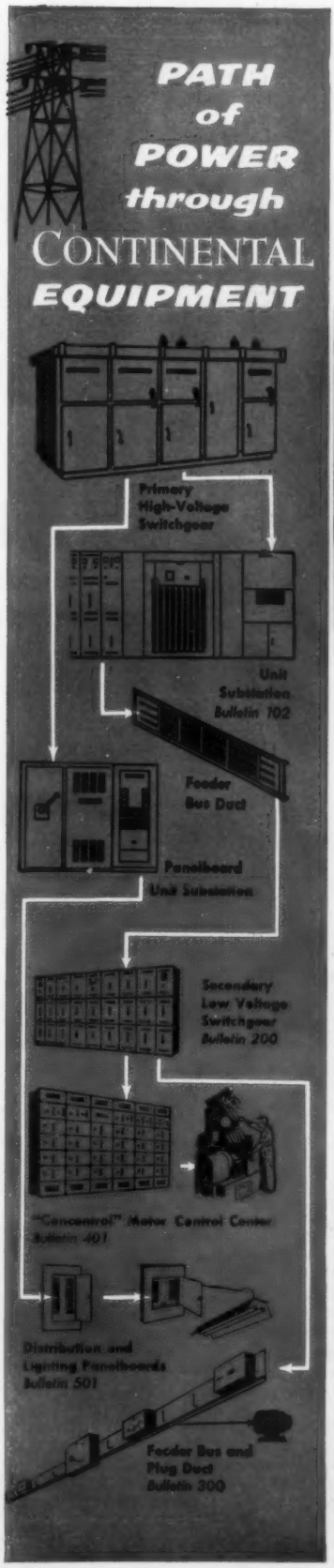

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USING CONTINENTAL BASIC STRUCTURES

The Basic Vertical Structure shown above, plus Unit Mounting Bases, and your choice of panel doors and other accessories, are the building blocks, available exclusively from Continental, that enable you to build your own economical Motor Control Center.

Use these structures singly, or in combinations, to provide a functional enclosure from your motor controls. Use starters and breakers from your own stock . . . wire the unit in your plant, using available labor to advantage.

Contact your Continental representative today, or write for new bulletin #475.

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New quality control-
Meter-Printed Batch Tickets with

NEPTUNE *liquid* METERS

Get printed proof of delivery and automatic control of liquids going into the batch . . . with the Neptune Print-O-Meter. Prints exact quantities, with serial numbers and code letters to identify the batch and/or station. Foolproof operation . . . ticket is inserted and locked in place in meter before delivery. Ticket cannot be removed before being printed out.

You get quality control and dispute-free printed records of delivery if you handle any of these liquids (and others too!). Print-O-Meter sizes: 1 to 4 in., capacities 5 to 500 gpm. Other meters 2 to 1000 gpm.

Send for free Technical Metering Bulletin 567-HPE.

How many of these liquids can you handle better with Neptune?

Acetates	Lime Water
Acetone	Linseed Oil
Alcohol	Liquid Soap
Ammonium Nitrate	Liquid Sugar
Ammonium Sulfate	Lubricating Oil
Banana Oil	Methylated Spirits
Barium Chloride	Methyl Bromide
Benzol	Methyl Formate
Borax Solution	Methyline Chloride
Brine	Mineral Spirits
Bunker "C"	Molasses
Butanol	Naphtha
Calcium Chloride	Oleic Acid
Carbon Bisulphide	Oleum Spirits
Carbon Tetrachloride	Paint
Castor Oil	Paraffin Oil
Cellulose Solvent	Paste
China Wood Oil	Perfume
Chloropicrin	Pine Oil
Chocolate	Plasticizer
Cocoa Butter	Polymer, Molten
Coconut Oil	Propylene Glycol
Coffee	Pyrethrum Mixtures
Condensate	Rum
Corn Syrup	Shellac (Alcohol)
Cotton Seed Oil	Silicone Oil
DDT	Soap Solution
Dextrine Solution	Sodium Benzoate
Diacetone	Sodium Carbonate
Dibutyl Phthalate	Sodium Chloride
Diethyl Carbitol	Sodium Silicate
Diethylene Glycol	Soy Bean Oil
Dimethyl Phthalate	Starch Solution
Ethyl Cellosolve	Stearic Acid
Ethylene Glycol	Styrene Monomer
Fish Oil	Sugar Syrups
Formaldehyde	Tallow
Freon	Tannic Acid
Fuel Oil, Hot	Trichlorethylene
Glucose	Tungwood Oil
Glue, Water Sol.	Turpentine
Glycerine	Varnish
Grease	Vinyl Lacquer
Ink	Water
Isobutylene	Wax Emulsions
Isopropanol	Whiskey
Kerosene	Wine
Lacquer	Xylol

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New Plant Construction

(Continued from page 160)

a 30 in. wide stainless steel cold reduction mill with auxiliary finishing facilities, as a first step in the plant's construction. Plans will eventually include an integrated mill, electric furnaces, a blooming mill and a hot strip mill.

Ada, Okla.—Ideal Cement Co., Denver National Bldg., Denver, Colo., plans to construct a new cement plant with an annual capacity of 1.5 million bbl. Work is already under way and plant is scheduled to be in operation by early 1958.

Muskogee, Okla. — Callery Chemical Co., Callery, Pa., has started to construct a new high energy fuel plant on large site here. Initial construction phase of the $38 million plant will include an administration building, three shops and a warehouse. Plant is expected to be placed on stream early in 1959. T. C. Bateson Construction Co., Dallas, Tex., has been awarded the construction contract.

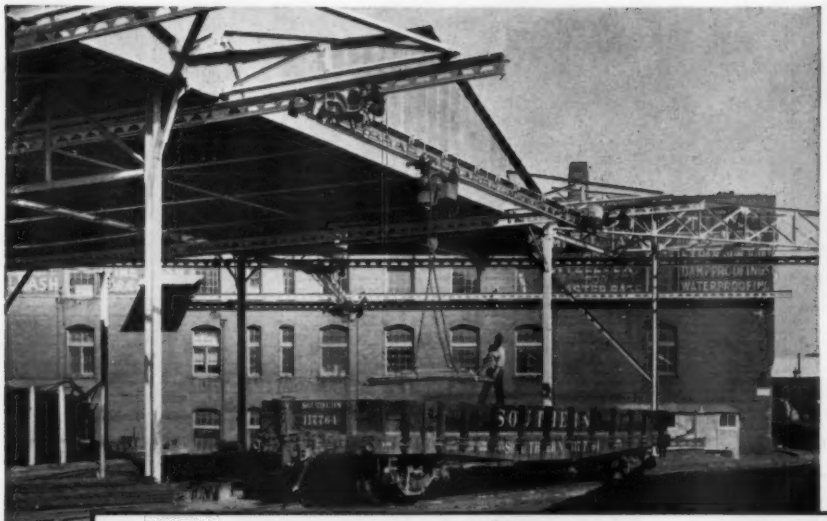
Coatesville, Pa. — Lukens Steel Co., 1949 Gillen St., plans to construct a new steel-plate testing laboratory at local plant. Construction will begin soon and laboratory is scheduled for completion by early 1958. Cost of new facility, with equipment, will exceed $1 million.

Pittsburgh, Pa.—Westinghouse Electric Corp., P.O. Box 868, has announced plans for 1957, involving capital expenditures of more than $75 million aimed at improving existing plants, rather than new construction. Of this total, only 20 per cent will be used for new plants, amounting to 1,000,000 sq ft of floor space. The balance will go toward new equipment, mostly automatic, and improving existing installations.

Calhoun, Tenn.—Bowater Paper Corp., Montreal, Canada, plans expansion of paper making facilities at the company's American facility known as the Southern Paper Corp., this city. New newsprint machine, to cost about $21 million will be operating in 1959, and it will boost total capacity of the Calhoun mill to 435,000 tons of newsprint annually.

New Johnsonville, Tenn.—E. I. du Pont de Nemours & Co., Du Pont Bldg., Wilmington, Del., plans to construct a third plant for the manufacture and production of titanium dioxide pigment. Plant will have a production capacity of 120 tons daily, and will be erected on a 1500 acre site purchased by the company, near here.

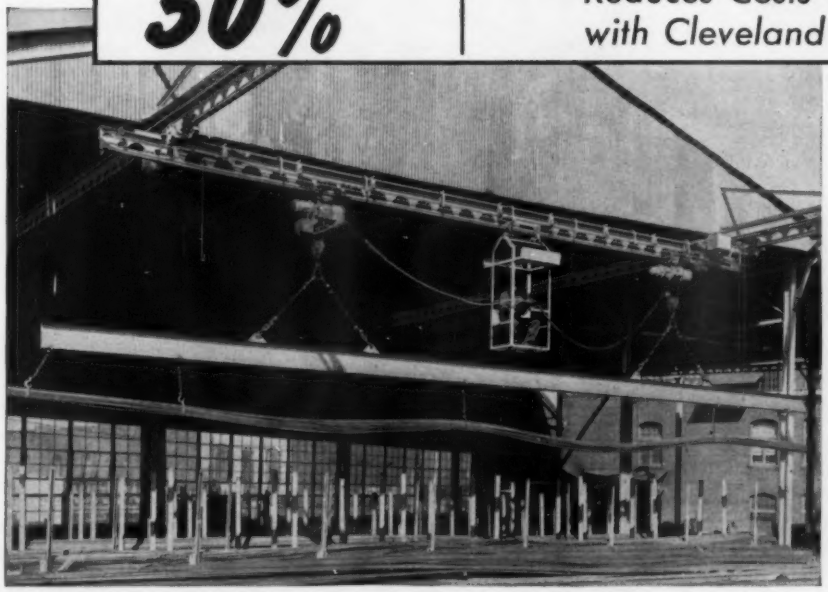
Beaumont, Texas—Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas, will construct a new distillation unit capable of processing about 100,000 bbl of crude oil daily. Work will get under way this spring with completion scheduled for mid-1958.



Unloading bundles of rod with a Cleveland Tramrail transfer crane arranged for push-button floor control. This crane may be interlocked with the track system serving various sections of the shop, enabling the load being delivered directly to point of use with the Tramrail hoist carrier without need of any in-between handling.

Rod Forming Plant Cuts Production Time 50%

Reduces Costs Tremendously with Cleveland Tramrail System



Here the same crane is shown with an operator's cab and second hoist carrier. The hoists support a lifting beam which will handle bundles of rod up to 60'-0" long. Note the runway extensions that permit spotting the crane directly over a gondola car.

"THERE is no comparison between a shop equipped with Cleveland Tramrail handling equipment and one using hand methods," said an executive of the Southern GF Co., Atlanta, Georgia.

He should know, because this prominent company has cut production costs in half in the cutting and forming of steel rod for concrete work. Savings are made with the tramrail starting with unloading of incoming steel and through the various steps of manufacture. For instance, only 10 man-hours are now required to unload a railroad car as compared to 45 formerly required.

The Cleveland Tramrail at Southern GF has been designed to provide the utmost in flexibility of handling. It consists of transfer cranes and a track and switch system. The crane used for car unloading can be arranged for floor control or cab control. The latter arrangement is used when 60-foot long bundles of rod are handled by two widely spaced hoists, the cab being located at the center of the bridge.

Write for free Engineering and Application Booklet No. 2008. Packed with valuable information.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

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For more facts circle 664 on Reply Card

Bendix Foundry Solves Belt Conveyor Problem

Bendix Aviation Corporation's South Bend plant was plagued with a stubborn belt conveyor maintenance problem. Foundry sand was lodging in steel belt idlers, causing them to freeze up. Despite frequent inspection and lubrication tours the frozen idlers sometimes cut through the belt making complete replacement necessary. Replacing a single idler required a two hour shutdown.

Then Bendix discovered a new way to handle the conveyor system. During a single weekend all the steel idlers were replaced with Joy Limberoller idlers. The Joy Limberoller is a single roller consisting of a series of pressure-molded neoprene discs on a flexible steel cable. Only two bearings are used and these are up out of the dirt zone. Two years after the Limberoller idlers were installed Bendix reported, "No Limberollers have been replaced—not one belt has been torn by an idler—and the inspection and lubrication tours have been completely discontinued."

The Limberoller idler works equally well with other difficult materials—coal or chemicals—ores or fertilizers. What's your materials handling problem? Get help from *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 132-15

Consult a Joy Engineer

For Air and Gas Compressors, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors

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NEW BOOKS

for the plant engineer

For Cleaner Air

AIR POLLUTION HANDBOOK edited by P. L. Magill, F. R. Holden and Chas. Ackley. Size 9⅜ x 6½ in.; 720 pp; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $15.00.

IN THIS BOOK is an array of facts that can be of use to all types of readers concerned with determining the nature, extent and effect of air pollution in specific situations, and in carrying out measures for abatement. The book has many contributors and is authoritative in each aspect it covers.

The wide-ranging treatment includes such diverse topics as: control of air pollution at the source; city planning and industrial plant location; sampling procedures; equipment and processes for abating air pollution; review of basic legal considerations involved in air pollution; and evaluation of weather effects.

Ovens and Dryers

INDUSTRIAL OVENS AND DRYERS. Size 11 by 8½ in.; 35 pp; illustrated; paper bound. Published by Factory Mutual Engineering Division, 1151 Boston-Providence Turnpike, Norwood, Massachusetts. Price $1.00.

LOSS PREVENTION BULLETIN NO. 14.15 contains invaluable data for men who design, install, buy or operate ovens and dryers. The publication is a complete, authoritative guide to fire and explosion safety. It was published primarily for the safety of industry insured in the Factory Mutuals. Because of its importance and unique nature it is made available to anyone interested.

There are seven principal parts in this book. These deal with: Factory Mutual installation acceptance; safety considerations for location; oven and dryer construction; fire safeguarding; fuel and vapor explosions; and inspection and tests of safety controls. A glossary pertaining to ovens and dryers is also included.

On Grounding

GROUNDING OF INDUSTRIAL POWER SYSTEMS. Size 11 by 8½ in.; 1956 publication; 40 pp; illustrated; paper bound. Published by American Institute of Electrical Engineers, 33 West Thirty-Ninth St., New York 18, N. Y. Price $1.20. Discount to members.

INFORMATION ON GROUNDING presented in this report is divided into four chapters. System grounding is covered in the first section which includes material on: factors influencing choice of grounded or ungrounded system; methods of grounding; and, selection and design of system grounding arrangements.

Equipment grounding is treated in the second chapter which encompasses such items as structures, outdoor stations, large generators, motor rooms, conductor enclosures and miscellaneous large motors. Attention has also been given to portable tool grounding.

Most of chapter three pertains to static electricity and contains some information on methods of static control. The final chapter is a study of earth connection dealing with soil resistivity, ground electrodes, and resistance measurement to earth.

Electricity

BASIC ELECTRICAL ENGINEERING by A. E. Fitzgerald and D. E. Higginbotham. Size 9¾ by 6½ in.; 540 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. Price $7.50.

RECOGNITION IS GIVEN in this book to the importance of electronics, measurements and control in engineering. The book covers the four main subdivisions of electrical engineering: circuit theory, machinery, industrial

electronics and measurements, and feedback control systems.

In this edition new concepts are introduced in a more gradual manner. Greater attention has been given to sign conventions and polarity markings. There is an increase in the number of examples with complete solutions, and a wide variety of tested problems are included.

New material appears in this second edition on magnetic amplifiers, transistors, self-balancing recorders and controllers, phase-sensitive modulation and demodulation, control amplifiers, a-c control motors, transfer function, and frequency-response modulation.

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New QUAKER hose for hot air ducting cuts heat loss up to 57%

Synthetic fabric jacket and silicone tube retain temperatures from upstream to downstream end

Made in continuous lengths up to 50′, this new Quaker hose easily withstands temperatures as high as +450°F; as low as −80°F.

As the above diagram shows, the hose keeps heat loss—and therefore energy loss—to a minimum. (Comparable outside temperature of ordinary hot air ducting material, such as stainless steel, would be about 400° F.). Both the silicone tube and the synthetic fabric jacket of Quaker's new hose hold the heat!

Other advantages? The hose is lightweight and fully flexible. And it resists abrasion.

Available in either single or double jacket, the hose comes in 1″ to 4″ I.D.'s. Sizes 1″ and 1¼″ I.D. can be made in 30′ continuous lengths; 1½″ to 4″ I.D. in 50′ lengths. The hose takes regular expansion and shank hose couplings.

Want more information? Write to: *H. K. Porter Company, Inc., Quaker Rubber Division, Philadelphia 24, Pennsylvania, or Pittsburg, California.*

HKP QUAKER RUBBER DIVISION
H. K. PORTER COMPANY, INC.

For more facts circle 667 on Reply Card

Western Maintenance Conference

(Continued from page 146)

to every plant engineer who can use them.

Chairman: C. G. Wyder, Maint. Editor, *Factory Management and Maintenance,* New York, N. Y. Speakers: D. W. Egleston, Maint. Engr., Marchant Calculators, Inc., Oakland, Calif.; and A. G. Sira, Shops Master, Pearl Harbor Naval Shipyard, Fleet Post Office, San Francisco, Calif.

Arriving at Work Standards—How to measure work. How to convert the results of work measurement into work standards. Setting up and using standard times. Use of ratio-delay studies and motion-time-measurement. Working with the industrial engineering department as to records, planning, scheduling and handling methods.

Chairman: P. G. Dunmire, Consultant, Oakland, Calif. Speaker: R. H. Edgecumbe, Chief Indus. Engr., Virtue Bros. Mfg. Co., Los Angeles, Calif.

Temporary Wall

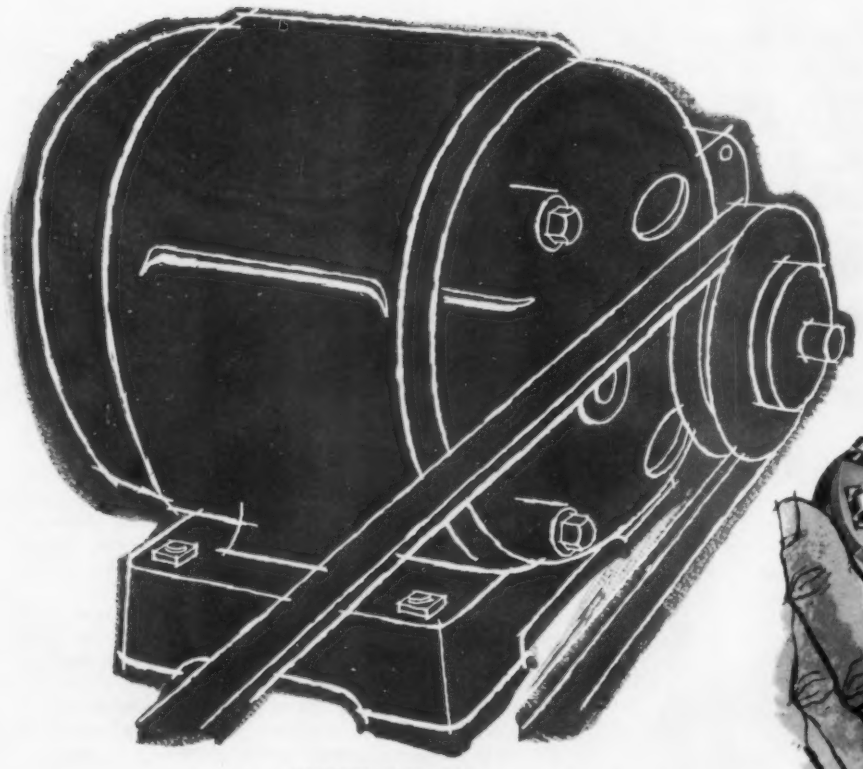
(Continued from page 142)

Our second problem of heating and ventilating the building was complicated by the fact that in the fabrication of underframes and hoods of the locomotives considerable welding and burning operations are involved. Six air changes per hour bringing in 100 per cent outside air were considered necessary in this shop under full production conditions.

In some buildings in the La Grange plant space heaters are used, but these do not provide any change of air, nor do they do an adequate job of air recirculation for us. These heaters require maintenance of the fans and steam systems as well as that of the electrical system which is quite difficult due to their position high in the roof of the building. For these reasons a forced air system was chosen for the new building.

For serving the five bays already constructed there are four fan houses, each having four 65,000 cfm fans. Fans are run by 40 hp and 50 hp squirrel cage type motors. Steam piped to the fan house at 150 psi is reduced to 30 psi before being supplied to the preheat and reheat coils which are sized to handle 100 per cent outside air to 100 per cent recirculated air. Air is filtered through roller type filters before being passed through ducts into the shop.

This arrangement makes it possible to have area heat control. Peripheral areas can be provided with sufficient warm air for comfort while cooler air is supplied to the center of the shop to compensate for heat produced by the burning and welding operations.



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can now have full engineered protection with a single, built-in KLIXON Protector

PREVENT OVERHEATING CAUSED BY:

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- **Single phasing**
- **Stalling**
- **Failure to start**
- **Lack of ventilation**
- **Increase in ambient temperature**
- **Plugging or reversing duty**
- **Unbalanced voltage**

Now your 3-phase Motors can have the same protection that motor manufacturers have for years engineered into single-phase motors. That's because Motor manufacturers everywhere can supply standard three-phase motors with built-in Klixon Protectors.

The result: you're assured of maximum work output with minimum down time.

Klixon 3-phase Protectors are now available for Motors ranging from fractional HP up to 7½ HP (600V).

BUILT-IN KLIXON AUTOMATIC AND MANUAL RESET PROTECTORS FOR 3-PHASE MOTORS:

- Reduce production down time
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- Minimize motor repairs and replacements
- Assure maximum motor capacity under any conditions
- Simplify motor controls

Specify and use
MOTORS WITH BUILT-IN KLIXON PROTECTORS

Get the details from your district motor salesman . . . then specify and use motors with Klixon Inherent Protectors. The additional cost is low . . . the savings high . . . the advantages really worth-while!

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KLIXON

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fast true pipe cuts on your power drive

Rolls are twice the usual width, double the bearing surface on pipe—sure straight start of cut . . . by hand or power drive—extra fast and easy. Pays you to see it before you buy your next cutter—at your Supply House.

No. 201, ⅛″ to 1¼″
No. 202, ¼″ to 2″

The Ridge Tool Company, Elyria, Ohio, U.S.A.

RIDGID
Work-Saver Pipe Tools

For more facts circle 669 on Reply Card

To Move or Not to Move

(Continued from page 104)

operation and needs before deciding the best solution. But one important point is to look in your own back yard first.

The following guide should prove helpful in arriving at the answer:

1. Analyze your requirements from the standpoint of square footage required—have your plant engineering and production people contribute their ideas on the advantages and disadvantages of several plant layouts. One-floor layout may be a costly luxury in the long run for some firms; may be a competitive necessity for others.

2. Determine what the physical maintenance cost of your present plant is per year. Some firms may find—to their surprise—that what they are spending for maintenance could be paying for a new building.

3. Estimate your moving costs—and add a healthy percentage to your original estimate to play safe.

4. Take into consideration shipping and receiving difficulties you will encounter in a suburban area which will create continuing expenses above and beyond those incurred in the city, i.e. extra vehicles, maintenance, salaries and the contingency of possible production interruptions due to delayed deliveries.

5. Analyze labor sources carefully for all areas under consideration. Determine as closely as possible the number of skilled, experienced personnel you might lose (or gain as the case might be) by moving.

At this point, call in the accountants to determine the true cost picture of city vs. suburban location—adding in hidden expenses brought to light by the foregoing analyses.

Then you will know whether to move or not to move. The surprisingly little time and money required for such a survey will prove to be one of the best insurance policies you ever bought.

Fluid Power Maintenance

(Continued from page 125)

location, then the piping or "plumbing" should be installed. A poor job of piping when the circuit is installed is likely to be the cause of circuit failure.

The installer has the choice of three kinds of piping, i.e., rigid, semi-rigid and flexible. Semi-rigid piping is gaining rapidly in popularity, although it usually costs considerably more than rigid piping when the cost of fittings for the semi-rigid piping is included. However, it is much more easily installed and more easily disassembled if it is necessary to remove a component. For compressed air service, the semi-rigid piping may be seamless steel tubing, aluminum tubing or copper tubing. With the introduction of flareless fittings, the installation of piping becomes rather an easy job.

When making a piping installation in a pneumatic system, here are some points to consider:

1. Whatever type of piping is used, make certain that it is clean. Remember the components of the system are precision pieces of equipment which are supposed to give long trouble-free service. If dirty pipe is used, the foreign matter can quickly ruin seals, surfaces and so on. Even if clean piping is used, make sure all burrs are removed.

2. Use piping that has an ample safety factor. Semi-rigid or rigid piping should have a safety factor of at least 8 and flexible hose should have a safety of at least 5.

3. Keep the length of pilot lines, especially where bleeder type master controls are used, at a minimum. Long lines will often cause these valves to malfunction.

4. Piping should be installed so that it will not interfere with the adjusting mechanisms or controls on any valve.

5. Piping should be installed so that it is readily re-

movable. Place pipe fittings so that they are easily accessible.

6. In piping cylinders having pivot or trunnion mounting, use oil resistant flexible lines. These lines should be long enough to allow the cylinder to move freely. Rotating cylinders should also be connected with oil resistant flexible lines. Much damage can be done to the air shaft packing if flexible lines are not used.

7. If a large machine having a pneumatic system is built in one plant and then is shipped to another, make certain that the disassembled piping runs are capped and the connections plugged in order to keep dirt out during transit.

8. Make certain that all pipe joints are tight. Leakage of compressed air is expensive.

9. Make a neat plumbing job. Fasten the piping with brackets; make smooth, even bends; keep piping to a minimum.

10. Use piping which corresponds to the size of the ports in the valves and cylinders in the circuit.

Installation is a very important item in your pneumatic system. Do a good job and you'll have good results.

Fuses—What They Can Do for You

(Continued from page 127)

destroy, the circuit. The difference between satisfactory and foulty operation is a matter of time at any particular value of current. If the fuse can be made to match this characteristic complete protection is possible.

The time factor was increased with the development of the super-lag renewable fuse. As the name implies the fuse can be renewed by replacing the blown zinc link with a new one but from a protection standpoint, the most interesting feature is the increased time-lag built into the device. A 100 amp 250 volt one-time fuse blows at 300 amps in 6.9 seconds whereas the 100 amp super-lag renewable fuse holds this same current for 12 seconds.

Hence, the size of the super-lag renewable fuse required to carry a given surge is less than that of the non-renewable fuse. This permits closer fusing on distribution circuits with diversified loads, but the time-lag of the renewable fuse is still not great enough to permit its rating to be selected equal to the load on circuits with concentrated motor loads.

Such protection is possible with the dual-element fuse. It consists of a short-circuiting strip surrounded by arc-quenching filler in each end of the fuse with a thermal overload device in the center. The physical dimensions of the fuse are the same as those of the other cartridge fuses shown in Table I. However, the construction makes possible sufficient time-lag so that, even on motor loads, the fuse size can be selected substantially equal to the load, giving complete protection from full load to short circuit. The recommended sizes of the dual-element fuses for motor loads are shown in Table II.

For the purpose of comparison the 100 amp 250 volt dual-element fuse holds 300 amps for 47 seconds. Comparing this with the 12 seconds for the super-lag and 6.9 seconds for the non-renewable fuse accents the greatly increased time-lag of the dual-element fuse.

In addition to the increased time-lag, dual-element fuses have an alternating current interrupting rating of 100,000 amps. This assures safe fuse performance on high capacity circuits under fault conditions. However, it should be remembered that the current limitation of the dual-element fuse is not as great as that of the silver link fuse. Roughly speaking, the silver link fuse has approximately four times the current limitation of the dual-element fuse. But the size of the silver link fuse usually is selected equal to four times the dual-element fuse on motor loads so that the current limitation of these smaller fuses is substan-

New RIDGID
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*Automatically Stops Threading After Standard Length Thread Is Cut

Power drive threading is safe and easy with this new 4PJ—no more watching of either die stock or drive! 4PJ can't jam—drive pinion kicks out automatically after full thread is cut. Extra-easy to handle . . . mistake-proof workholder, no bushings . . . fully enclosed gears . . . RIDGID most-for-your-money—Buy new 4PJ at your Supply House!

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The Ridge Tool Company, Elyria, Ohio, U.S.A.

RIDGID
Work-Saver Pipe Tools

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tially equal to that of the larger silver link fuse.

The dual-element fuse also furnishes thermal protection to switches and panel boards in which they are installed. The thermal element in the center of the fuse operates at 280 F so that the dual-element fuse will open when this temperature is reached. Heat generated by loose connections or damaged switch parts is conducted into the fuse and causes it to open before the switch or panel board is destroyed. Therefore the dual-element fuse provides convenient protection against potential trouble in the fuse cabinet. In addition, the fuse itself generates less heat thereby reducing the danger of overheating the fuse panel.

Making Test Fixtures?

(Continued from page 133)

minus 100 F, and between zero altitude and 60,000-ft altitude. So when we designed and built our temperature and altitude test facility, we designed it to encompass these ranges.

It would be somewhat foolhardy to do less, for the major cost of such a facility does not lie in the structure itself, but in the vacuum pumps and in the heating and cooling equipment necessary to produce the required environmental conditions. So we at Pastushin Aviation Corporation feel that it is a good idea to design altitude and temperature chambers both large enough for future products and strong enough to withstand extreme pressure deviations as any saving accomplished by "skimping" on the structural features will be completely overshadowed by the cost of the equipment required to operate it.

Very few test structures operate continuously. In fact, many of them may stand idle for long periods of time. Thus permanent instrumentation on a test fixture represents inoperative capital when fixture is not being used.

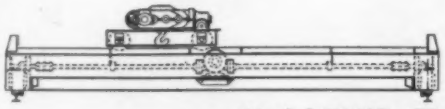
To minimize this insofar as possible, Pastushin engineers instrumented a conventional small house trailer with the more commonly used "universal" instruments such as oscilloscope, oscillograph, temperature devices, etc. Many of these instruments are permanently mounted in the trailer and attached to their own control panel. Leads extend outside. Complete work bench facilities are provided in one end of the trailer for use by the test engineers during remote field tests.

The darkroom for development of oscillograph records is located in the

middle of the trailer. By close cooperation between experimental personnel, it seldom happens that the trailer with its instrumentation is needed at two places at the same time. But any occasional inconvenience that may be encountered, is far more than offset by the savings realized by not having to install permanent and duplicate instrumentation on the various test facilities we operate.

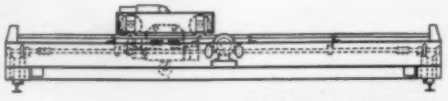
It is impossible to tell anyone how to build a test structure that doesn't appear in catalogs and, perhaps, has never been built before. Not knowing what products will be tested and the results required adds more complications. We have not tried to unravel this situation. But we do feel that the problems faced by Pastushin engineers are similar to those faced by engineers in other companies of similar size and working within budget limitations.

STANDARD HEADROOM
Provides highest hook height with top-running trolley and foot mounted hoisting unit.



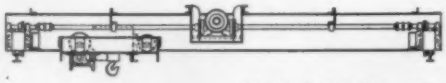
Model DTMD—TT

MEDIUM HEADROOM
Here the hoisting unit is rigidly suspended from the top-running trolley to reduce clearance over rail.



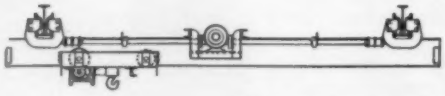
Model DTMD—LT

LOW HEADROOM
Under-running trolley permits unusually high hook lift. Use it where clearance under bridge must be maximum.



Model DTMD—UT

SUSPENDED TRACK
Operates on lower flange of crane runway suspended from roof guiders or other overhead support. Use also where load transfer is desired.



Model DUMD—UT

there is a
CRANEMASTER
for any building condition

Send For **BULLETIN C-101**

Describes in detail the many design and operating advantages of CRANEMASTER overhead traveling cranes. Also explains how Abell-Howe provides competent service from original survey to final installation.

ABELL-HOWE COMPANY 7747 Van Buren Street • Forest Park, Illinois

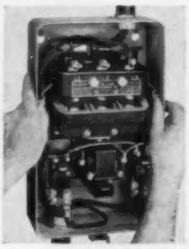
For more facts circle 671 on Reply Card

CLARK Type "CY" Starters need less maintenance ...when they do, it takes less time!

All parts in Clark Type "CY" AC magnetic starters are designed for dependable, heavy-duty, long-life operation. The exclusive "CY" principle of arc quenching—using strong multi-turn magnetic blowouts and double-break contacts—substantially lengthens contact life by minimizing arcing effects. Hundreds of thousands of Type "CY" starters in actual service have proved that these features mean less frequent maintenance.

When service or alteration is required either because of wear or change of application, Clark Type "CY" design makes the work easier and much faster. All parts are readily accessible from the front—screw-driver and wrench are the only tools needed. Service kits are available for all replacements. Times shown below include all operations, starting with a wired unit in a cabinet. The starter illustrated is Size 2, but servicing other sizes is correspondingly simple.

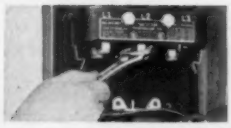
INSPECT CONTACTS AND SPRINGS



Simply open snap-action clips to release lower arc shield, exposing all contact surfaces to view. Replace arc shield after inspection. No tools required. Contact springs are in view at all times.

TIME—10 SECONDS

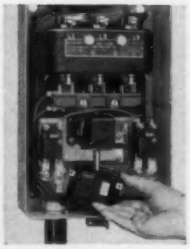
REPLACE CONTACTS AND SPRINGS



Loosen two captive screws holding movable contact arm in place. Release lower arc shield by opening snap-action clips. Remove contact arm and lower arc shield together. Movable contacts are removed by a simple twist to depress springs. Remove springs. Stationary contacts are loosened with a wrench. Reverse operations for installing new springs and contacts.

TIME—2½ MINUTES

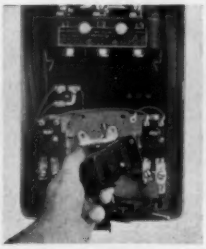
REPLACE COIL



Remove snap-in pin to release armature. Remove coil connections. Remove coil clamps held by two captive screws. Coil drops free. Reverse operation for replacement.

TIME—2 MINUTES

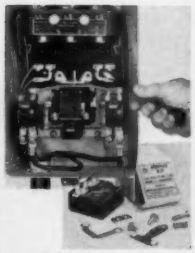
REPLACE MAGNET ASSEMBLY



Remove contact arm. Remove armature and coil. Take out 4 holding screws and lift out magnet. Reverse operation for installing new magnet assembly.

TIME—4½ MINUTES

ADD CONTROL CIRCUIT CONTACT



Remove main contact arm. Attach new control circuit block with stationary contacts to base plate (one screw). Mount movable control circuit contact and spring on main contact arm (one screw). Reassemble.

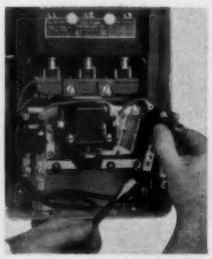
TIME (Exclusive of Wiring)—1½ MINUTES

CHANGE OVERLOAD HEATER COILS

Remove overload relay cover plate held by one captive screw. Remove 2 connection screws and take out heater coil. Reverse operation for installing new coil.

TIME—2½ MINUTES
(Total for replacing both coils)

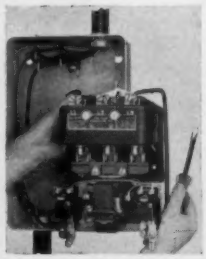
REPLACE OVERLOAD RELAY



Disconnect wiring and take out 2 screws holding relay mounting bracket to base plate. Remove old relay from mounting bracket. Reverse operation for replacement.

TIME—4 MINUTES

REMOVE STARTER FROM CABINET



Disconnect external wiring. Loosen or remove 3 screws holding starter to base plate (Note: on size 2 and smaller, all screw holes are slotted and screws need only be loosened). Lift starter from cabinet.

TIME—1½ MINUTES

Clark Type "CY" AC Magnetic Starters are now available in sizes 0 through 4.
For complete information contact your nearest Clark distributor or sales office, or write us direct.

The **CLARK** **CONTROLLER** *Company*

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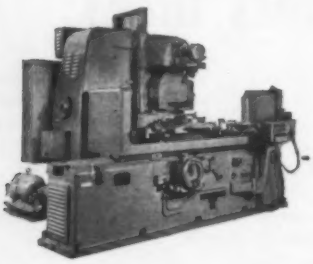
Thompson Precision Surface Grinder, Type C

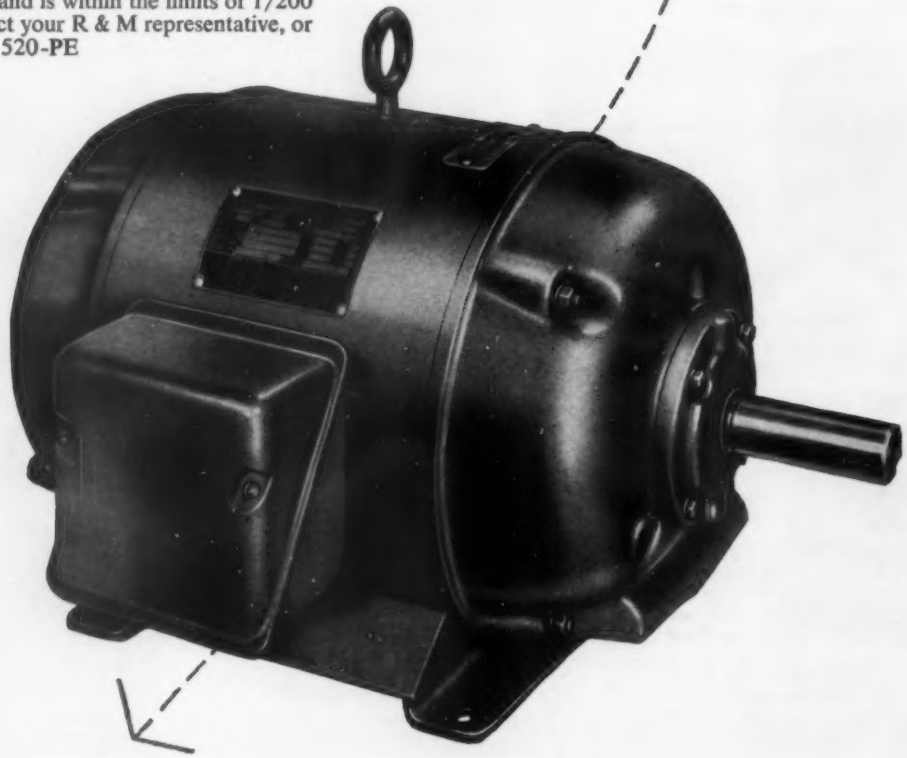


Thompson Grinders are world famous for accuracy. Their precision depends to a great extent, on the smooth running R & M hydraulic pump drive motors and the motor parts in the spindle head. Since even slight vibration in a precision machine tool destroys fine surface finish, Thompson engineers have wisely chosen R & M Motors because of dependability and running smoothness.

Freedom from vibration in a motor depends upon the physical balancing of moving parts and also the elimination of torque impulses set up in the windings. All R & M rotors are balanced to have less than .000025 inches of vibration amplitude and torsional vibration is eliminated by designing the windings for balanced magnetic symmetry.

If your application requires smoothness, dependable performance and is within the limits of 1/200 to 200 H.P. contact your R & M representative, or write for Bulletin 520-PE

motor balance boosts Thompson precision!



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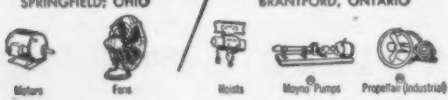

Motors Fans Hoists Moyno® Pumps Propeller (Industrial) Fans

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BULLETINS

(Begins on page 21)

158 **Balanced Valve Regulator** — Bulletin 1082, Rev. 2, 12 pp, describes company's 014 low-pressure balanced valve regulators. Includes a detailed schematic drawing illustrating use of the high-pressure regulator for pilot-loading of the 014. A similar drawing showing use of Type 39 power pilot regulator for the same purpose, with the help of a new adapter which facilitates mounting, is also included. Meter and Valve Div., Rockwell Mfg. Co.

159 **Steam Trap Guide**—Bulletin 154 is a condensed buying guide on steam traps. Contains specifications, capacities, sizes, pressures, weights and list prices for all principal types of Super-Silvertop traps. Outstanding features are reviewed. Bulletin also gives data on self-cleaning strainers and steel series steam traps. The V. D. Anderson Co.

160 **Improved Steam Trap**—The Monovalve float thermostatic steam trap for draining steam-hot condensate, is introduced in 8-pp Catalog 600. Explains how three functions are combined in one valve. Features of trap are stressed, and drawings show its action in air venting, steam trapping, draining low and high capacity, serving as check valve. Physical and capacity data on this bimetallic trap are provided. Velan Valve Corp.

162 **Data on Purifiers**—This 8-pp 1957 catalog (Bulletin 801) covers uses and advantages of company's purifiers which prevent mist carryover from process vessels; remove compressor oil, condensate from steam, air and gas vapor; separate solids and liquids from natural gas; and eliminate condensate and oil from steam systems. Information is included on improved types of internal purifiers, line type purifiers, receiver type scrubbers. A selection chart shows recommended sizes of line type units at various steam flows on different pressures. The V. D. Anderson Co.

163 **Expansion Joints**—Bulletin EJ-1915, 8 pp, describes company's Type W Gun-Pakt expansion joints, featuring an improved one-piece design of body and gland which eliminates customary bolted joint between body and gland. Gives data on how to figure expansion of pipe lines and suggestions for installation of expansion joints. Yarnall-Waring Co.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on the facing page.

164 **Piping Fittings**—Speedline corrosion-resistant fittings for stainless steel piping are described and illustrated in this 24-pp catalog. Connectors, flanges, reducers, expanders, tees, bends and unions are among types covered. Special advantages, including the "tangential feature" for easier installation, are discussed. Dimensional and torque data are provided, as are test results. Also described is Speedline heat exchanger. Booklet includes general information on soldering, welding, and silver brazing of stainless steel. Horace T. Potts Co.

TUBING AND PIPE

165 **Stainless Tubing, Pipe**—This bulletin on 17-7PH stainless tubing and pipe gives a description of the alloy in tubular forms, along with analysis, recommended uses, typical mechanical properties, corrosion resistance, workability and hardening characteristics. Also covers physical and non-destructive tests given tubing and pipe in manufacture. Alloy Tube Div., The Carpenter Steel Co.

166 **Pressure Tubing**—This bulletin describes characteristics and installation advantages of flexible polyamide tubing along with available sizes and information on where to use it. Also included are pictures and operating instructions for installation tools, such as the flaring tool and tube cutter, tube bending clips and a heat bending tool for fixed radial bends. The Polymer Corp. of Pennsylvania.

167 **Welded Steel Tubing**—How to cut costs, get faster production and improved design with welded steel tubing is told in this illustrated folder. Also describes how finishing operations can be eliminated with zinc-coated or aluminized steel tubing. Armco Steel Corp.

FANS, VENTILATING

169 **Power Roof Ventilator**—Introductory Bulletin 550 describes company's Centrilator, a centrifugal type power roof ventilator. Advantages of operation and design are detailed, and a condensed capacity table is included. Dimensional diagrams and data are also given. Clarage Fan Co.

170 **Corrosive Fume Venting**—This 10-pp report covers importance and use of corrosive fume ventilation equipment. Illustrates and covers recommended exhaust rates, procedures, air flow types, system types and fume removal equipment types and their applications. Although emphasizing plating room equipment, this report contains suggestions of general value in fume venting. Heil Process Equipment Corp.

171 **Cooling Tower Fans**—Bulletin A-111B, 8 pp, covers company's adjustable-pitch cooling tower and heat exchanger fans. Contains descriptions, specifications and performance data on fans with aluminum-alloy blades in diameters from 40 to 132 in. and models with plastic blades in diameters from 10 to 22 ft. It also includes detailed data on controllable-pitch fans. Hartzell Propeller Fan Co.

INSTRUMENTS, CONTROLS

173 **Temperature Regulators**—This bulletin describes company's Series UB packless balanced self-operating temperature regulators for regulating steam to control temperature of ovens, drying or processing kilns, tubes, water tanks, other industrial heating applications. Includes photos, engineering drawings, construction features, principles of operation, specifications. Cash Standard Stacon Corp.

174 **Level Alarms, Controls**—Many standard applications for Magnetrols are illustrated and described in this bulletin. They include boiler water level control, pump control, high or low level alarm and shutdown, others. Specifications and price data are provided for two models of extended float cage units, and brief descriptive information is given for several others. Meters and Controls, Inc.

175 **Automation System**—This 8-pp bulletin describes a system which brings complete automation to the power inputs of electrostatic precipitators, eliminating manual adjustments and increasing round-the-clock dust and fume collection efficiencies. Defines "ideal electrical power" and demonstrates, by means of comparative charts, how this precipitator power level, required for optimum performance, can be more closely approached by automation than by manual control. Research-Cottrell, Inc.

176 **Temperature Control**—How to automatically control building temperatures from outdoors is described in Bulletin P-257. Points out that economical and comfortable heating can be obtained only when temperature control is motivated by outdoor temperatures. Automatic Devices Co., Inc.

177 **Gage Accessories**—Bulletin 600 describes accessories for various types of gages, dial thermometers and recorders. These accessories include attachments for protection of instrument internals against corrosive media and pulsations in pressures; also shows the ring by which turret-case instruments can be panel-mounted. U. S. Gauge Div., American Machine and Metals, Inc.

178 **Control Centers**—Electronic control centers, a new concept in automatic temperature control, are illustrated and described in 8-pp, full-color Booklet F 8031. Discusses functions, uses and advantages of centralized automatic control with visual supervision of entire heating and air conditioning system. Barber-Colman Co.

179 **Cooling Tower Control**—Bulletin 1050 discusses a system for automatically controlling make-up water flow, chemical feed, and blowdown rate of cooling towers. Use of this system may conserve water and chemicals, reduce manpower needs and cut maintenance costs. A typical system is shown. Bailey Meter Co.

180 **Indicating Controllers**—Catalog C $\frac{600}{700}$ 1, 8 pp, describes small-case indicating pneumatic controllers for temperature and pressure. Specifications common to both temperature and pressure controllers, as well as individual specification, are included. Photos, drawings and ordering information also given. Industrial Div., Minneapolis-Honeywell Regulator Co.

Suggestions on Protecting Buildings and Equipment

181 **Fire Protection Planning**—This 12-pp booklet covers planning of fire protection for structures and equipment associated with power generation and transmission. Discusses needs in power plants, switchyards, substations. Information given also applies to transformers and similar electrical installations in industrial plants. A feature is an application chart covering water spray, mechanical foam, carbon dioxide, and dry chemical systems. Chart gives characteristics of each system with regard to requirements of each type of equipment and flammable material encountered. Automatic Sprinkler Corp. of America.

182 **On Galvanic Protection**—Two new reference manuals discuss zinc as a galvanic anode to protect iron and steel from corrosion. Sixteen-pp "Zinc as a Galvanic Anode Underwater" tells how zinc anodes protect water storage tanks, H piping in sea water, traveling water screens, and lock gates. Step-by-step procedures are given for effective salt water applications. "Zinc as a Galvanic Anode Underground," 40 pp, discusses theory and practice of zinc anode application in transmission pipe lines, gas distribution systems, ground rods, grounding cells, others. Recommendations indicate best methods of applying zinc for protecting underground systems and structures made of steel. American Zinc Institute, Inc.

183 **Masonry Water Repellents**—Various benefits provided by silicone masonry water repellents and specifications for applying are described in Bulletin CDS-81. Photos show results of laboratory tests on effectiveness of silicones in minimizing water absorption, efflorescence, spalling and cracking. General Electric Co.

METALS, METAL PRODUCTS

184 **Special Steels For Industry**—This 232-pp ring-bound catalog is designed to show the industrial steel user at a glance the complete range of grades and sizes available from stock, describing over 700 products. Its index lists 16 categories of special purpose steels, including high speed, tool, stainless, alloy and machinery, available in 16,000 grades and sizes. Over 20 estimating, conversions and weight tables as well as other information are also included. Book is available to qualified plant engineers. Please state your job title when requesting it. Crucible Steel Co. of America.

185 **High Temperature Alloys**—Engineering properties and fabrication of ten high-strength alloys for elevated temperature service are described in this 20-pp bulletin. Technical information includes physical constants, mechanical properties at room and elevated temperatures, heat treatment, forging, cold working, welding and corrosion resistance. Recommended uses are given for each alloy with a discussion of how to use stress-rupture and creep data in designing components for high temperature service. The Carpenter Steel Co.

186 **Aluminum Mill Products**—This 18-pp 1957 catalog is a reference guide for preliminary discussion of design and fabrication considerations. A feature is information on industrial foil. Includes selection guides for wrought alloys in sheet, plate and foil, wire rod and bar, tubing and pipe, extruded and structural shapes, and for casting alloys. Also provides information on fabricating and finishing aluminum products, on styling and engineering services, and on company literature and films available. Reynolds Metals Co.

187 **Perforated Metals**—Wisco perforated metals for industrial and ornamental purposes are discussed in this folder. Gives ordering specifications for metals available in various patterns including cane, lattice, slat and standard round perforations. Actual-size photos, specifications for maximum sheet widths, per-

BULLETINS

(Begins on page 21)

centage of free air opening and cost per gage are included. Wickwire Spencer Steel Div., The Colorado Fuel and Iron Corp.

SPACE, PROCESS HEATING

188 On Gas Unit Heating—Pocket-size Bulletin SA-571, 20 pp, presents data on application of gas unit heating. An aid in determining situations in which this system of heating can be applied, it gives basic information on selection and installation of equipment. Not a technical manual, it serves as an outline to proper use of gas unit heaters. Tells when and where to use these heaters, how they cut heating costs. Reznor Mfg. Co.

189 Water Heater Data—Complete information on company's copper-lined storage water heaters is presented in Data File, 16. Designed for use as a file folder, it contains all data needed to specify and select these heaters for industrial or other installation. Bulletins contained within the file cover provide diagram of construction details and recommended minimum specifications: a tabular section of dimensions, heating capacities and engineering data; installation tips and piping arrangements; case histories of typical installations. The Patterson-Kelley Co.

190 Storage Heaters—This 20-pp catalog on hot water storage heaters, presents both horizontal and vertical units. Specifications, capacity data and installation diagrams are provided. Standard heating elements are described and available alloys and linings for heater shells are discussed. Booklet also provides information on submerged water heaters and on condensate coolers or economizers. Richmond Engineering Co. Inc.

191 Heating Elements—This 12-pp pocket-size booklet covers company's silicon carbide heating elements, including information on handling, unpacking, storage, installation and replacement of heating elements. It is enclosed in an envelope for hanging on wall next to furnaces for ready reference. The Carborundum Co.

192 Electric Furnaces—Bulletin 28-150, 12 pp, describes box-type electric furnaces for tool room applications. It is illustrated with cutaway drawings and diagrams showing design features of six basic furnace types. Advantages and performance data for each type are included. Westinghouse Electric Corp.

Reference Literature on Some Versatile Materials

193 Micarta Manual—Dealing with architectural use of Micarta, this 22-pp manual is divided into six sections. The first gives general information on the product, including details on how it is made. Another is a compilation of technical data, including sizes, types and grades of Micarta, physical characteristics and information on basic fabrication. Two sections are devoted to applications. Another section offers a guide for writing of architectural specifications for use of Micarta. The sixth section, illustrated in full color, provides a color and pattern chart. United States Plywood Corp.

194 Carbon-Graphite Materials—Characteristics of mechanical carbon-graphite materials are detailed in this 16-pp illustrated bulletin. Physical properties are described and load rating charts included, as well as information on standard grades, bearings in operation, seal rings, and other applications. Several typical examples of use of carbon-graphite bearings, wheels and sheaves in a wide range of industries are pictured and discussed as to resulting benefits. Electro-Nite Carbon Co.

195 Silicone Applications—Typical uses where silicones are exceptionally beneficial are described in illustrated 8-pp Bulletin CDS-97. Among uses described are rubber products, cosmetics and polishes, electrical insulation, water repellents, textile finishes, lubricants, release and anti-foam agents. Lists specialized literature covering product and application information as well as major products. General Electric Co.

196 Synthetic Rubbers—Neoprene and Hypalon are discussed in detail in 16-pp Form A-2972. Durability, weather resistance, chemical resistance, elasticity, abrasion resistance and other features are covered. A chart shows how Neoprene compares with other rubber materials, and Hypalon's colorability is stressed. Each of the two synthetic rubbers is treated separately to show design advantages. Elastomer Chemicals Dept., E. I. du Pont de Nemours & Co.

OTHER EQUIPMENT

197 Metal Working Machines — Forty-pp Booklet 203 summarizes data on power operated machines for plate and sheet metal work. Pocket-size, it provides basic specification charts, tabulated for easy reading, which provide quick reference to all principal models. References are made to available bulletins dealing specifically with various machines and lines. Shears, a variety of presses, slip roll formers, and bench-type power presses are covered. Niagara Machine & Tool Works.

198 On Teflon Packings—Service and technical details on chemically inert mechanical packings fabricated from Teflon are provided in 8-pp Bulletin P-325 on Chemlon packings. Presents braided types, rings, molded packings, cup and cone rings and combination sets. Bulletin gives recommendations as to applications and temperatures. Crane Packing Co.

199 Multi-Zone Conditioners—Eight multi-zone conditioners in this company's Flow-Temp line are described in 12-pp Catalog 383. These units are specifically designed for buildings in which heating and cooling are required simultaneously; they range in capacity from 1370 to 21,000 cfm of air. Engineering specifications, capacities, selection examples, performance tables, dimensions and a description of accessories are included. Acme Industries, Inc.

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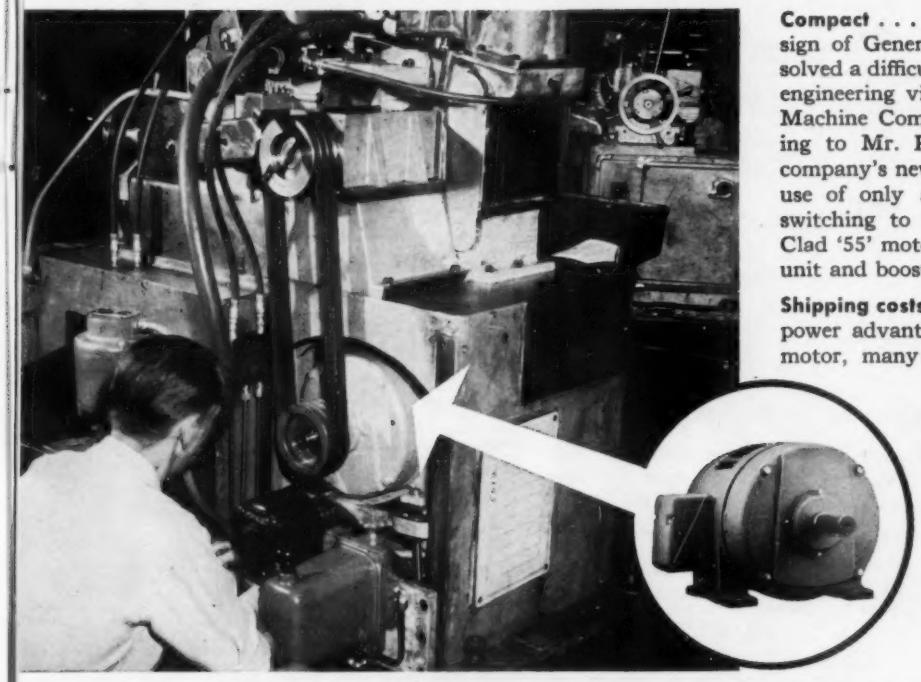

Compact . . . power-packed—The compact design of General Electric's Tri-Clad '55' motor solved a difficult power problem for Roger Pyne, engineering vice-president of the Van Norman Machine Company, Springfield, Mass. According to Mr. Pyne, "space limitations on the company's new centerless grinder permitted the use of only a 5-hp conventional motor. By switching to the smaller, more compact Tri-Clad '55' motor we were able to go to a 7½-hp unit and boost our grinder's capacity by 50%."

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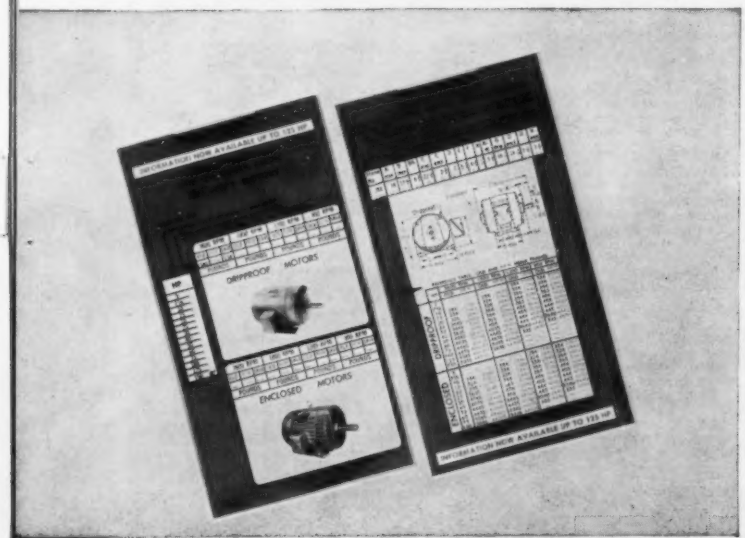

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BULLETINS

(Begins on page 21)

200 **Industrial Tools**—This 36-pp catalog gives complete descriptions, specifications and list prices of company's line of tools for industrial applications. It covers end mills, Woodruff keyseat cutters, center reamers and combined drills and countersinks. Fastcut Tool Co.

201 **Product Guide**—Bulletin AP-100, 12 pp, describes products offered by manufacturer and facilities available to plant engineers through cooperative research in fluid sealing and related problems. Also described are specialized mechanical sealing materials: synthetic rubber compounds and mechanical leathers. Products covered include shaft and end-face seals, molded parts, mechanical cups, packings and washers, non-metallic gears and pinions, others. Size ranges, specifications and performance data are included. Chicago Rawhide Mfg. Co.

202 **Industrial Closures**—Furnished complete with data sheets and actual samples, this illustrated file folder presents the recently expanded line of CaPlugs (polyethylene closures). Summarizes important data on threaded and non-threaded caps and plugs for safeguarding products in process, storage and transit. Enclosed are dimension and price sheets for over 300 stocked sizes of 10 standard designs used to protect tubing, valves, hydraulic components, numerous machined parts and fittings. CaPlugs Div., Protective Closures Co., Inc.

204 **Permanent Magnets**—Catalog PM-121, 12 pp, covers both cast and sintered permanent magnets. It includes information on magnetic and mechanical properties, approximate tolerances, magnet assemblies, as well as service and ordering. Illustrations and engineering data are included. General Electric Co.

205 **Steam Cleaner**—Form 17-A-19-R describes the 1250 series of Hypressure Jenny steam cleaners. Construction features are detailed and several models of the instant steaming units are illustrated. These cleaners have a minimum capacity of 120 gph, operate normally at 80 to 100 lb pressure. Oil-fired and gas-fired models are shown. Hypressure Jenny Div., Homestead Valve Mfg. Co.

206 **Box Closure Methods**—This 18-pp brochure is intended as a guide for evaluation of methods currently in use to effect economies and stepped-up production in closure of fibreboard boxes. It contains information on closure methods, and describes such methods as hand and machine gluing, taping, stapling and wire stitching. A special section on regulations for sealing fibreboard containers gives basic rules covering slotted containers. Acme Steel Co.

207 **Industrial Silencers**—A line of industrial and other silencers is described in detail in this 24-pp catalog. Applications of the various types of silencers are detailed, as well as construction features and installation. Dimensions, design principles, photos of typical applications, and other data are included. Kittell Muffler & Engineering Co., Inc.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 263-264.

STORAGE EQUIPMENT

301 **Adjustable Shelving**—How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

302 **Storage Equipment**—Catalog 100-E, 72 pp illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

303 **Storage Shelving**—Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

MATERIALS HANDLING

304 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

305 **For Overhead Handling**—Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes, transfer cranes and gantry cranes; safety electrification; buckets and grabs. Cleveland-Tramrail Div., The Cleveland Crane & Engineering Co.

306 **Overhead Cranes**—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Electrical information included. Chicago Tramrail Corp.

307 **How to Choose a Crane**—Designed to aid in the selection of overhead cranes, 8-pp Unit 79 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

308 **Trolley Conveyors**—Continuous overhead conveyor systems are featured in profusely illustrated, 132-pp Catalog 50. Describes outstanding advantages such as adaptability, self-programming operation, automatic timing, space saving storage, adequate supply of parts, worker conservation, assembly on the conveyor and others. Dimensions and data on various types of trolley and attachments are given. Jervis B. Webb Co.

309 **Engineered Conveyors**—Bulletin 156, 8 pp, discusses design and performance of company's material handling and production systems, engineered to solve specific problems in the handling and production of various materials. Covers overhead conveyors, ultra time and synchronized conveyors, trans-free conveyors. Allied Steel and Conveyors Div., The Sparks-Withington Co.

310 **Standard, Special Conveyors**—Catalog 400, 20 pp, describes standard and special conveyors for a variety of materials handling applications in industry. Photos of typical installations illustrate roller conveyors, wheel conveyors, live roller conveyors, belt conveyor, pusher bar conveyor, elevating equipment, overhead cable trolley, overhead chain trolley, special handling equipment, slat conveyor, drag chain conveyor. The E. W. Buschman Co.

311 **Engineered Conveyor Systems**—Catalog 835, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyer Co.

312 **Conveyor Belt Chart**—Engineering data for standard conveyor belt construction is given in this chart and accompanying sheet. Strength characteristics of eight popular ply and material combinations of conveyor belt constructions are provided. Each property is printed on the chart in a different color to facilitate comparison. Quaker Rubber Corp., Div., H. K. Porter Co., Inc.

313 **Steel Conveyor Belts**—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

314 **Cost-Cutting Materials Handling**—"The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet covering various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices, analysis of handling organization, collecting handling data, diagramming route of travel, and the use of particular materials handling equipment. A "Vis-O-Graf" summary on procedures to check efficiency of a materials handling system is included. The Yale & Towne Mfg. Co.

315 **Load Handling Equipment**—Bulletin 406, 24 pp, covers company's Budgit, Tugit and Load Lifter products and other load handling specialties. Catalog numbers, sizes and specifications are tabulated, and application photos of the various products are included. Complete specifications and principal dimensions are indicated on tables. Manning, Maxwell & Moore, Inc.

316 **Oil-Hydraulic Lifts**—Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

317 **Electric Hoists**—This illustrated brochure describes company's line of electric hoists designed for big-lift applications. A large cut-away view showing component features is included. R. G. LeTourneau, Inc.

318 **Casters and Wheels**—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

SLINGS, CHAINS, WIRE ROPE

320 **Industrial Wire Rope**—Bulletin DH-128D, 24 pp, features wire rope recommendations for industrial services. Covers more than 120 types of wire ropes used in construction, conveyors, cranes, dredges, steel mill and blast furnaces, coal bridges, guy ropes, inclines, platform lift trucks and winch lines. Each recommendation covers such points as rope diameters, construction, preforming, lay, grade and core. In addition, charts covering weights and breaking strengths are provided. American Cable Div., American Chain & Cable Co., Inc.

321 **Sling Chain Handbook**—Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights and working load limits under many conditions. Columbus McKinnon Chain Corp.

322 **Sling Handbook**—The 64-pp Tuffy Sling Handbook is replete with illustrations, charts and diagrams describing 16 factory fitted slings and nearly two dozen standard fittings available for slings, including several which are recent additions to the line. Book contains a

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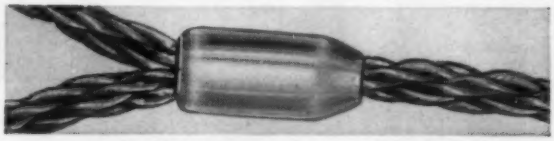
You'll find it next to impossible to kink a Tuffy sling by hand. If you succeed, even with the aid of a vise, see how easily the braided fabric can be straightened out with no material damage.

Tuffy's Streamlined Ferrule is Pressed On Over Tucked Eye-Splices for 100% Strength of Sling

Tremendous machine pressure swages Tuffy's smooth-edged metal ferrule around the tuck splice. Metal virtually "flows" into the braided fabric interstices. This compressive treatment gives the eye of the sling 100% of the strength of the wire fabric. Eyes *stay* spliced!



Tuffy Hoist Line Delivers Big Extras of Dependability and Long Wear

Tuffy Hoist Line is a special rope construction for hoisting on all types of over-head, stiff leg and mobile cranes, derricks and clamshells. Combines extra flexibility and toughness to absorb load shocks. Tuffy slings and hoist lines work with hand-and-glove harmony to cut hoisting costs and downtime in every kind of materials handling.

Give Tuffy "the Works;" then Take a Long Look at the Increase in Sling Service You Get Per Dollar

Tuffy asks no coddling. Put Tuffy slings on your toughest jobs. Give them the "full treatment" of hard service. They'll take it, and then some. And you'll be ahead in dollars saved by Tuffy's longer wear and faster handling. The secret is the patented machine-braided construction of Tuffy slings. It produces a combination of extra flexibility and extra toughness never possible with ordinary wire rope — and a big step ahead of costly hand-braided slings. This 9-part Tuffy fabric is precision-braided by machine in a way that eliminates the inequalities of hand-braiding. Tuffy Slings have no cores. Even when one of the 9 parts is cut or broken, it does not result in stranding.

Watch Your Men Sling Loads Faster, Easier, with Greater Safety

Tuffy fabric and Tuffy's pressed-on ferrule team up to speed up sling work. The high flexibility and kink resistance of Tuffy slings make for smooth handling, and the Tuffy ferrule makes a pulled-out splice virtually a thing of the past. Because the ends of the ferrule are swaged flush with the machine-braided strands, there are no projections to snag on loads or injure hands. No wonder handlers work faster, safer, with Tuffy slings.

Your Tuffy Distributor will help you give Tuffy Slings and Hoist Lines "the works" test on the job you choose

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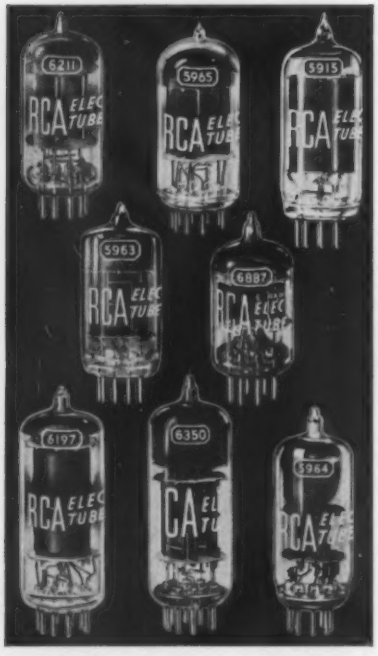

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DATA FILE

(Begins on page 268)

complete rigger's manual, shop chart of ratings, an engineer's notebook and standard signals for directing operations of overhead traveling cranes and derricks and locomotives. A new development featured is the steel ferrule splice now on all Tuffy slings, which affords safety and other advantages. Union Wire Rope Corp.

323 Preformed Wire Rope—Stainless steel and monel metal preformed wire rope is described in this informative bulletin. Constructions of different type of wire rope are illustrated, typical uses are listed, and engineering information such as breaking strength in pounds per 100 ft is charted. Macwhyte Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

324 Bronze Valves—Globe and angle bronze valve with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. The Walworth Co.

325 Diaphragm Valves—Catalog V-55, 34 pp, covers operation, installation and selection of diaphragm valves for handling of acids, alkalis, gases, volatile and viscous substances, water and other fluids, compressed air vacuum, slurries, semi-solids, beverages and food products. Diaphragm materials are described, selection tables included. Hills-McCanna Co.

326 Lubricated Plug Valves—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

327 High Pressure Valves—Bulletin B-451, 12 pp, contains complete engineering data on company's valves for high pressure and high temperatures. Typical installations are pictured, dimensions and weights are tabulated, and temperature-pressure ratings are shown. A selection table is included, as well as information on materials, design. Yarnall-Waring Co.

328 Unions, Check Valves—Illustrated Catalog 55, 24 pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Also included is table on water discharge. Clayton Mark & Co.

329 Control Valves—Air and hydraulic control valves designed for high-speed, rugged performance are the subject of 6-pp Bulletin 561. Advantages are pointed out and a number of different models are illustrated, including single solenoid valve, double solenoid valve, pilot operated valves, and lever operated valves. C. B. Hunt & Son, Inc.

330 Valve Comparison Chart—Form 194R, 22 pp, is a valve comparison chart, listing valve figure numbers of 15 major manufacturers and the OIC equivalent valve figure numbers. Compares variety of valves in ferrous and nonferrous materials, describes different valve lines. The Ohio Injector Co.

331 For Valve Selection—Circular 555, 24 pp, is designed as a guide for selecting valves, boiler mountings, and lubricating devices, including the LQ600 bronze globe valves, Luncor PVC all-molded valves, and solder end valves. Tables, technical data and information on the selection of valves, boiler mountings, and lubricating devices are completely indexed for easy reference. The Lunkenheimer Co.

332 Valve Performance Facts—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Industries include paper mills, refineries, central stations, other plants. Crane Co.

333 Valve Data—This loose-leaf notebook contains a collection of company's bulletins on its line of valves for control of air, gas,

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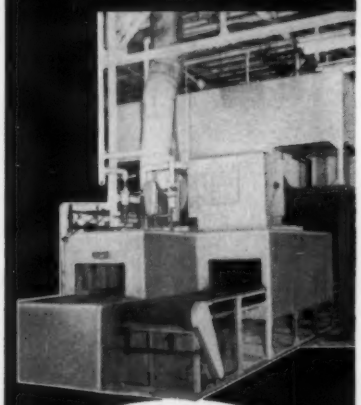

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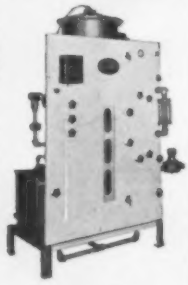

Left, typical Model LU or HB Two-Bed De-Ionizer, each series made in six sizes covering maximum flow rates ranging from 150 to 1000 gals. per hr.

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DATA FILE

(Begins on page 268)

liquids and solids. It features complete operating, design, dimensional and specification data on butterfly, slide, automatic and proportioning valves, and is profusely illustrated with photos, drawings and diagrams highlighting valve design. W. S. Rockwell Co.

334 Steam Trap Book—Catalog J is a 44-pp manual and ordering guide in which 17 pp are devoted to data on fundamentals of good trapping and trap selection. Installation and maintenance instructions are also provided. Book lists steam traps for maximum pressures of 250, 600, 900, 1500 and 2500 psig. Included, also, is a section on trouble shooting. Armstrong Machine Works.

335 Steam, Air and Gasoline Traps—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for pressure up to 1500 lb. W. H. Nicholson & Co.

336 Pipe for Modern Buildings—This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings. A. M. Byers Co.

337 Coupling Data—Bulletin 240 describes a quick-connect, quick-disconnect H coupling, its uses and construction, with particular reference to U-packer which gives positive seal without compression set because of rubber distortion. A fully detailed cutaway of coupling is included and dimensions and ordering information given. Snap-Tite, Inc.

338 Jointed Clay Pipe—Advantages of jointed vitrified clay pipe designed to limit and control leakage of ground water in sanitary systems are described in this illustrated bulletin. Performance characteristics are discussed and typical installations are pictured. American Vitrified Products Co.

339 Swivel Joints—Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on these products, this booklet is generously illustrated. Chiksan Co.

INSULATION

340 Piping Insulation—Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping where maximum efficiency is of primary importance and for hot water and low pressure steam. Gustin-Bacon Mfg. Co.

341 Pipe Insulation—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between —300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

FANS, VENTILATING

342 Induced Draft Fan Data—In addition to providing an illustrated discussion of design advantages of company's induced draft Bifucator, 20-pp Bulletin DB-44-56 is an excellent working tool on fan selection. Two methods are presented, along with detailed examples of each. Also included are boiler code ratings of various organizations expressed in Btu/hr, and charts on draft losses. Dimensional diagrams are provided, as well. Typical installations are pictured. DeBothezat Fans Div., American Machine and Metals, Inc.

343 Industrial Fan Catalog—Of interest to plant engineers requiring quick, accurate selection of industrial fans for specified capacities, 28-pp Bulletin EX-531 contains selection tables from which correct fan for required capacity can be determined. Complete descriptive in-

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United States Steel Corporation produces high-quality USS Galvanized Steel Sheets and Structural Steels which are used by manufacturers of durable steel buildings. For information about where *you* can get an all-steel, all-purpose building, write to United States Steel, Room 2831, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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DATA FILE

(Begins on page 268)

formation, detailed capacity tables and dimensional data are included. Introduces a new fan offering improved efficiency. Bayley Blower Co.

344 **Industrial Fans**—Bulletin 702A features company's line of fan equipment for industrial air and material handling applications. Photos illustrate various types available, and complete descriptive detail and a table of general data are included. Clarage Fan Co.

345 **Standard Duty Fans**—Designs and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 543. Points out advantages, shows arrangement and application, describes accessories. Tables list specifications. The New York Blower Co.

346 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stack-booster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

347 **Propeller Fans**—Pictorial Bulletin FM-2345, 24 pp, describes design and fabrication of heavy-duty propeller fans and related package units. Covers various types of power roof ventilators, water coolers, heat pump installations, dual service condenser, and evaporator packages, fan assemblies for dry coil condensers, air washer and scrubber installations, stainless steel equipment for corrosive conditions, and others. Sizes, capacities and construction data included. Buffalo Forge Co.

348 **Ventilating Equipment**—A 36-pp guide to selection of propeller fan type ventilating equipment, Catalog 152 includes specifications and installation data on company's propeller fans in portable, tubeaxial, centrifugal, roof ventilator and other types. Detailed illustrations of contruction features accent design and performance factors. Case study photos show installations. Ilg Electric Ventilating Co.

349 **Roof Ventilators**—Sixteen-pp Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data and dimensional drawings are included. Hartzell Propeller Fan Co.

DUST CONTROL

350 **Dry-Type Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

351 **Industrial Dust Control**—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included, as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

352 **Dust Collectors**—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

353 **Dust Control Systems**—Valuable engineering data on methods of dust control as well as descriptions of company's line of dust collectors are contained in illustrated Bulletin 636-2. Specifications on all models are included. Aget Mfg. Co.

354 **Flexible Hose**—A set of five bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

ELECTRICAL

355 **Motor Buying Tips**—Bulletins GEC-1026A and GEC 1027A, each 11 pp, give buying information on a selected group of this manufacturer's motors. Included are application data, ratings and prices for fractional horsepower motors, integral-horsepower polyphase and single phase induction motors, motors and control for part winding starting, gear-motors and resilient-base integral-horsepower induction motors. General Electric Co.

356 **Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

357 **Commutator Slip Ring Maintenance**—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

358 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

359 **Motor Controls**—In the 86-pp Controlog are cataloged a variety of motor controls including starters, control centers, contactors, relays, switches, and accessories. Fully illustrated with photos and dimensional drawings, gives applications and descriptive information on each class, and includes prices and ordering data. General engineering data included. The Clark Controller Co.

360 **Motor Starters**—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type HS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

361 **Air Interrupter Switch**—Bulletin 100, 8 pp, provides full details on company's high voltage air interrupter switch. The comprehensive description includes case and cutaway photos, multiple position illustrations, dimensional drawings, typical specifications and examples of built-in installations. Cutaway photos illustrate three front-operated types available and photos showing installation procedure are included. Continental Electric Equipment Co.

362 **Enclosed Breakers**—Catalog 1-155, 20 pp, describes standardized new types of AB-I enclosed circuit breakers with 600 v ratings ranging from 15 to 600 amp. Text, illustrations and tables supply complete data covering the range of available AB breakers and enclosures, purchasing information, optional accessories and application. Application information, knockout data included. Federal Pacific Electric Co.

363 **High-Capacity Fuses**—Form HCS, 6 pp, describes fuses of unlimited interrupting capacity on voltages to 600, designed to afford protection for loads of 600 to 5000 amp. Includes test data, charts on opening time, current limiting effect. Bussman Mfg. Co.

364 **What You Should Know About Circuit Breakers**—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, in-rush current effects, tripping and reset time. Heinemann Electric Co.

365 **Enclosed Switches**—Catalog 83, 28 pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

366 **Low Voltage Switchgear**—Twelve-pp Bulletin 6004B presents low voltage switchgear of the metal-enclosed, drawout type for indoor and outdoor installation using Types K

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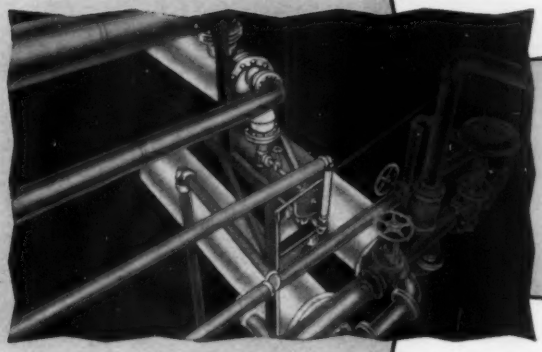

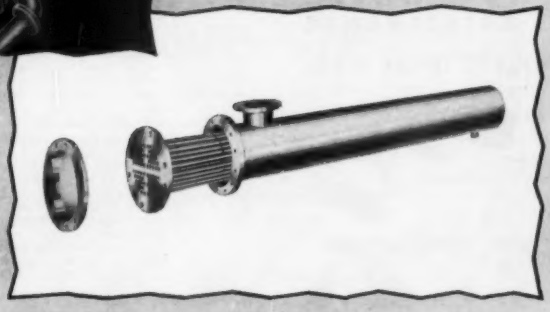

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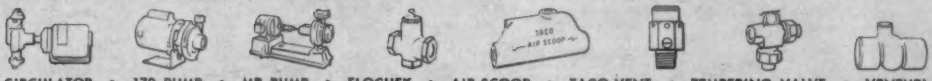

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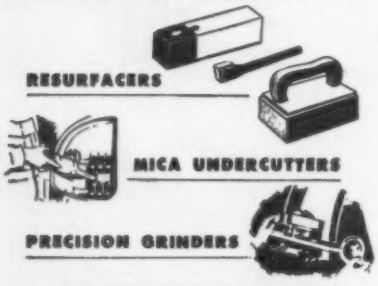

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DATA FILE

(Begins on page 268)

and LG air circuit breakers. Design and construction details are explained and illustrated and emphasis is placed on safety advantages afforded by test position with door closed. General specifications and standard frame arrangements given. I-T-E Circuit Breaker Co.

367 Panel Components—Bulletin EE-120 is a 54-pp panel builders handbook of electrical components, containing specifications, diagrams, dimensions, photos and price lists of company's motor control. Profusely illustrated with photos, dimensional and wiring diagrams, bulletin covers manual starters, relays and contactors, magnetic starters in non-reversing, reversing, and multi-speed types, and a group of accessories which include thermal overload relays, oil tight pushbutton units, limit switches, timing devices, solenoids, electrical interlocks, and solenoid-operated brakes. Cutler-Hammer, Inc.

368 Aluminum Conduit Fittings—To fulfill the need for electrical equipment made of materials which resist corrosive attack of many chemicals destructive to ferrous or standard aluminum equipment, Bulletin 2681 presents a broad selection of Condulets and related equipment utilizing copper-free aluminum alloy in their construction. It includes Condulets, lighting fixtures, plugs and receptacles and others for both hazardous and non-hazardous locations. Book provides a pictorial-descriptive index plus full catalog listings, prices. Crouse-Hinds Co.

369 Electrical Wires, Cable—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages of the products are detailed, a table of insulations furnished, and design and construction features illustrated. The Okonite Co.

370 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulation resistance, mechanical moisture absorption, electrical moisture absorption, capacity and power factor. Diagrams, charts and tables amplify text. Anaconda Wire & Cable Co.

371 Electrical Conduit—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic acid, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

372 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

373 Asbestos Insulation—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Also measures plus values of the construction over and above industry standards. Standards for test characteristics, such as minimum permissible breakdown after initial dielectric test are covered. Rockbestos Products Corp.

374 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

375 Flexible Cords—This well-illustrated 24-pp booklet includes all new Underwriters classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

376 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers, and many special fastening devices to save time and labor. Contains full instructions for installation, load charts, accessory items. The Globe Co.

377 Battery Manual—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

378 Handbook on Storage Batteries—This 64-pp booklet on instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

379 Motive Power Batteries—This 48-pp general service manual on lead-acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions, and charging methods. C. & D. Batteries, Inc.

380 Testing Instruments—Bulletin 19-56, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features, operating ranges, and suggested applications for them. James G. Biddle Co.

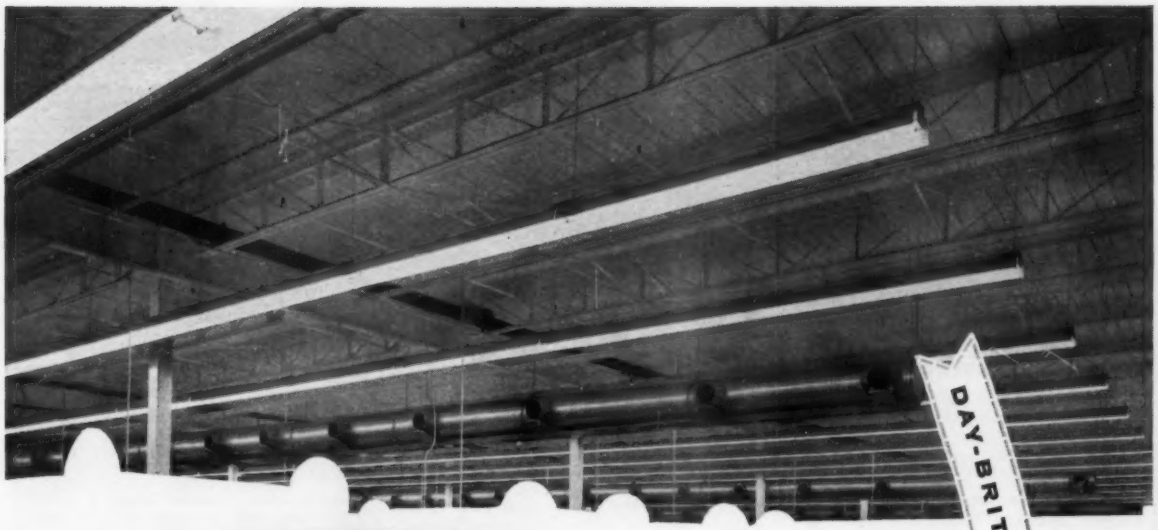
LIGHTING, COMMUNICATION

381 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. A chapter on interior lighting design describes ways of calculating quantity of light for an area and covers such subjects as selection of lighting systems, maintenance factors, and location of luminaires. A series of tables minimize mathematical calculations necessary. Westinghouse Electric Corp.

382 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient economical floodlighting installation. A table of recommended foot-candle levels for exteriors provided. General Electric Co.

383 Recessed Lighting—Divided into sections to aid in selection of lighting units, this 36-pp catalog gives complete illustrations and detailed dimensional data for one- and two-foot architectural troffers in all types of ceiling construction. Includes information on various ceiling lighting patterns, plus selection of shielding designs in plastic, glass, lens (flat and dished), plastic louvers. Also gives photometric tables. Smithcraft Lighting Div.

384 Outdoor Mercury Lighting—"How Mercury Vapor Outdoor Lighting Brings More Night Action," 8 pp, stresses low cost and versatility of mercury vapor lamps. Shows their use in such locations as industrial areas, parking lots. Includes data on company's new Silver White lamp, which offers an increase in effi-



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This lighting puts ceilings to work

Day-Brite CFI (Comfort For Industry) fixtures are the first competitively priced industrial line designed with *slotted reflectors* that direct a portion of light upward.

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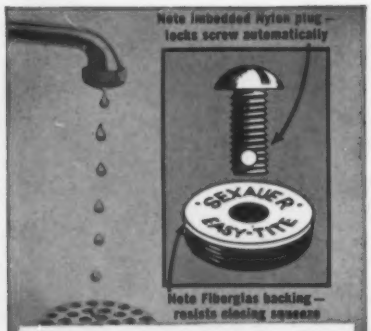
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SEXAUER EASY-TITE
Note Fiberglas backing—resists closing squeeze

Why Faucets Leak

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DATA FILE

(Begins on page 268)

ciency over clear lamps. Also features Golden Mercury Vapor lamp, which provides a "warmer" light and is a natural caution light. Sylvania Electric Products Inc.

385 Plant Lighting Planning Guide—This 32-pp handbook of industrial lighting presents economics of plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Mfg. Co.

386 Industrial Lighting—Designed to be inserted in company's lighting catalog, these two data sheets describe application, construction, installations and wiring details of two types of lighting units. Section 30, Sheet 20 features all-porcelain industrial units and Section 30 Sheet 18 covers vapor-tight units. Engineering data included. Day-Brite Lighting, Inc.

387 Lighting Unit Specifications—The new 1957 edition of the "RLM Standard Specifications for Industrial Lighting Units" contains important revisions in specifications on both incandescent and fluorescent units, as well as new lighting data. Of special importance are new coefficient of utilization tables for eight units. Calculations are based on latest zonal method of computing coefficients of utilization and illumination on room surfaces. Also included are revised light distribution curves on RLM direct and semi-direct fluorescent units, popularly called "upward light." Candlepower distribution curves are plotted at normal, parallel and 45 deg. RLM Standards Institute.

388 Signal Equipment—Tips on how to select suitable signals for any specific operations are offered in one of a series of bulletins—Nos. 100-125—bound in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

MECHANICAL POWER TRANSMISSION

389 Roller Chains, Sprockets—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

390 Sprockets and Chain — Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper-Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

391 Helical Gear Drives—A new line of in-line helical gear drives is described in 16-pp Book 2651. Load classes for over 250 applications, overhung load ratings and dimension tables, instructions for proper selection and cut-away views of both double and triple reduction drives are given. Link-Belt Co.

392 Fluid Drive — Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables are provided for direct connected and V-belt types. American Blower Corp.

393 Fluid Couplings—Bulletin 144-D, 14 pp, presents complete installation and performance data on fluid couplings. Illustrated with dia-

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Reversible Ratchet STOCKS and Adjustable DIES

Exceptionally convenient where space is limited, this stock simplifies pipe threading close to walls, in corners and whenever operating room is restricted. With *adjustable* dies (cut exact, over or under size threads) it is an ideal tool where valves and fittings are being installed or maintained.

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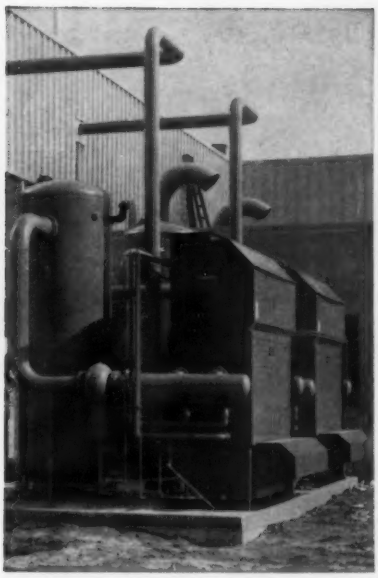

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THE NIAGARA *AERO* AFTER COOLER offers a completely self-contained method replacing both shell-and-tube cooler and cooling tower. It is independent of a large supply of cooling water and consistently reduces compressed air temperatures to below ambient.

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Direct saving in the cost of cooling water saves the price of the Niagara *Aero* After Cooler in less than two years.

Niagara *Aero* After Cooler assures all these benefits because it cools compressed air or gas below the temperature of surrounding atmosphere; there can be no further condensation in your air lines. It condenses the moisture by passing the air through a coil on the surface of which water is evaporated, transferring the heat to the atmosphere. It is installed outdoors, protected from freezing in winter, proven in service on the largest plant utility systems.

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DATA FILE

(Begins on page 268)

grams and drawings, bulletin shows ease of applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from 3/4 to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

394 **Adjustable V-Belt** — This 8-pp catalog covers company's Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install the belts. Manheim Mfg. & Belting Co.

395 **Flexible Couplings**—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

LUBRICATION

396 **For Better Lubrication**—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

397 **Detergent Oils**—How to clean sludge out of hydraulic and lubrication system without shutting down machines is told in Technical Bulletin 44. Also tells how continued use of these highly detergent oils keeps equipment as clean as new. Sun Oil Co.

398 **Lubricant Data Book**—The 16-pp current edition of this company's popular Lubriplate Data Book offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under normal and special conditions are provided. Several pages are devoted to lubricant recommendations for equipment used in a variety of industries—bottling plants, chemical and food processing, metalworking, iron and steel plants, textile plants, woodworking, pulp and paper machinery. Lubriplate Div., Fiske Bros. Refining Co.

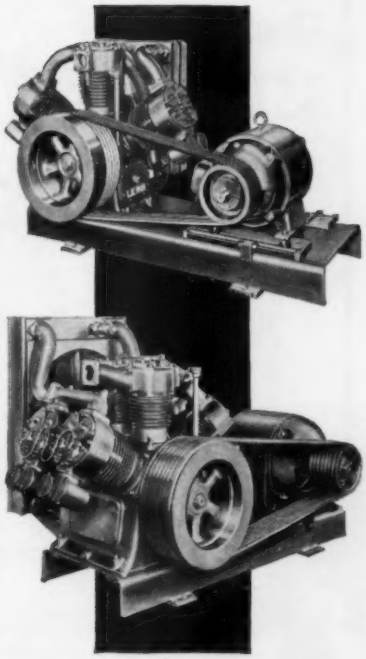
399 **Oil Maintenance Equipment** — Bulletin 172 offers pointers on diesel and gas engine lubricating and fuel oil maintenance. Includes general recommendations for lubricating oil filters, data on filter materials, and various filters. Oil Purifier Div., The Hilliard Corp.

400 **Lubricating Air Conditioning Machinery** —The problems of lubrication of air conditioning machinery are discussed in V-41 No. 7 of "Lubrication," a company magazine. Describes various components of refrigerating system and discusses lubrication practice, effects of refrigerants on lubricating oil, oil carryover, and lubricating oil requirements. The Texas Co.

INSTRUMENTS, CONTROLS

401 **Temperature Controls** — Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices. The Partlow Corp.

402 **Versatile Electronics** — How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility and broad application are described. Minneapolis-Honeywell Regulator Co.



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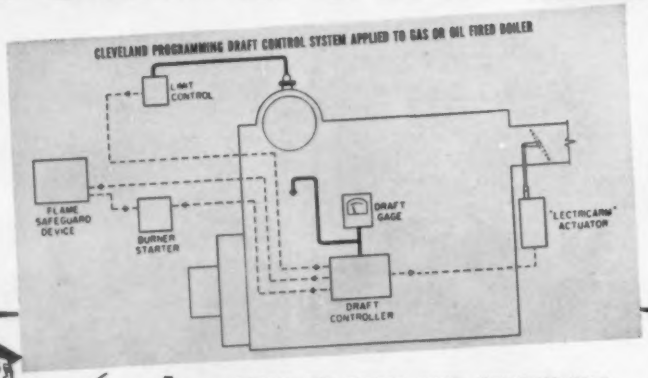

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DATA FILE

(Begins on page 268)

403 Service Regulators — Revised Bulletin 1026, 20 pp, features company's line of service regulators. Rate-of-flow graphs illustrate mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by extra safety device in case of failure of regulator. Rockwell Mfg. Co.

404 For Industrial Metering—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select the proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

405 Contour Projectors—The use of projection or optical gaging with company's contour projectors is discussed in this illustrated bulletin. Points out chief advantages and describes typical applications. Specifications and dimensional diagrams for a number of models are included. Eastman Kodak Co.

406 Combustion Controls—Included in this catalog (about 16 pp) are product descriptions of company's combustion instruments and controls. Covers damper controls; drive units; draft, air pressure and flue temperature gages; steam controls; panel board cabinets; low-draft cut-off switches. Pages are fully illustrated to show design and operational details, and brief text includes application suggestions, special features. Cleveland Fuel Equipment Co.

PACKINGS, GASKETS, SEALS

407 Mechanical Seals — Bulletin AD-150, 8 pp, features complete data on Type BB-21A Mechanipak seal. Tells how it works and illustrates operation and design features with cutaway drawings. Typical applications are listed and specifications are tabulated. The Garlock Packing Co.

408 Teflon Products—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

PUMPS, COMPRESSORS

409 General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. An engineering section covers recommended speeds and capacities. Viking Pump Co.

410 For Abusive Pumping Jobs — Catalog 4906, 36 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

411 Condensed Pump Data — Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications and features. Goulds Pumps, Inc.

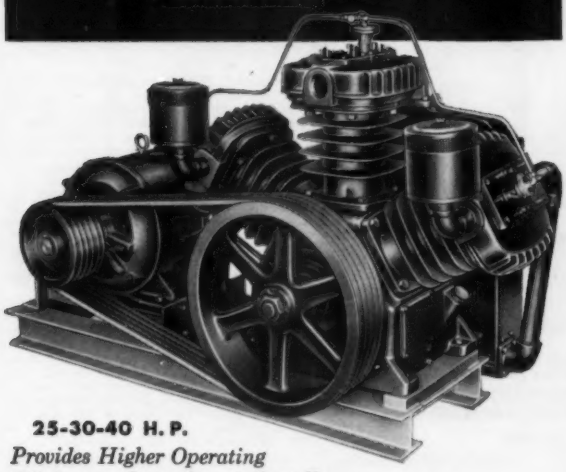
412 Condensation Pumps—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment.

CURTIS MODEL C-100

Two-Stage, Air-Cooled Air Compressor

Delivers *MORE* Air...

PER MINUTE HORSEPOWER KILOWATT HOUR OF ELECTRICAL ENERGY CONSUMED



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Provides Higher Operating Efficiency Costs Less to Install

The Curtis Two-Stage Compressor assures a saving in your power costs. It's air cooled, thereby eliminating expensive water bills—quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

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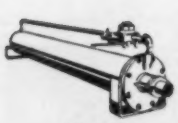
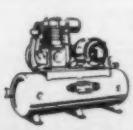


AIR HOISTS AIR CYLINDERS



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PACKAGED AND REMOTE AIR CONDITIONING

CM-21

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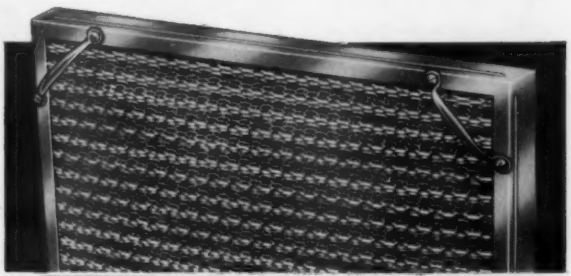
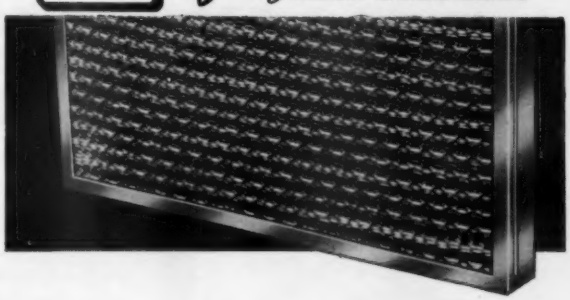
48% MORE AIR DELIVERY

. . . from initial resistance to 1.00" wg with positive air cleaning results



Evans *Lifelong* **AIR FILTERS**



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Cleans air without strangling air stream. Allows **faster release** of air from filter's air cleaning medium.

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Increases
Operator's Rangeability
Stability of Control
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Decreases
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Standard parts—prompt delivery—maximum flexibility of application make mounting of operator at point of valve installation quick and easy. Made for valves to 48" size.

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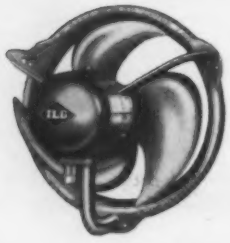

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PFMA label certifies all ratings.

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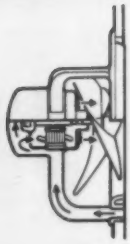

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Offices in 56 Principal Cities

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DATA FILE

(Begins on page 268)

Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

413 **Close Coupled Pumps**—Revised Bulletin 242 describes design and operation advantages of company's close coupled pumps for industry, and includes large cutaway views illustrating component features. A composite rating table is included, as well as dimensions and other data. Warren Steam Pump Co., Inc.

414 **Rotary Pumps**—Bulletin 10, 8 pp, describes self-priming rotary pumps for liquid materials handling. Design features, selection, unit constructions are detailed, and complete selection data given. Blackmer Pump Co.

415 **Industrial Compressors**—Bulletin SSB-56 covers company's complete line of industrial air compressors from the 1/2 hp to 150 hp, including the accessories that go to make a complete installation. Photos of the various models are included, as well as specifications and dimensions. Schramm, Inc.

416 **Air Compressors**—Bulletin A-62, 20 pp, covers construction, operation information on company's class WN-112 heavy-duty air compressors. Illustrates five models of compressor, for displacement capacities from 368 to 974 cfm at sea level, and four high altitude models for 532 to 1100 cfm. Joy Mfg. Co.

417 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines. Le Roi Div., Westinghouse Air Brake Co.

418 **Gas-Engine Driven Compressors**—A two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features are discussed. Clark Bros. Co.

419 **Compressor Data**—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts, including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Variable capacity control information is listed along with data on governors. Diagram illustrates correct selection and coordination of auxiliary equipment. Worthington Corp.

420 **Air Cooled Compressors**—Bulletin AC-15, 16 pp, shows a complete line of small, air-cooled compressors for industrial and other use. Both one- and two-stage compressors are covered, with working pressures ranging from 85 to 175 psi. Complete specifications for each model are given and two charts—one for figuring compressor needs and another showing estimated air consumption for 30 common shop jobs—are printed. Gardner-Denver Co.

421 **For On-the-Spot Air**—Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

FILTERING

422 **Air Filters**—Eight-pp Bulletin 117 describes advantages of company's Poro-Stone air filters for compressed air lines. Typical applications are illustrated and described, and operating details, capacities and dimensions given. Aftercoolers and cyclone separators are also covered. R. P. Adams Co., Inc.

423 **Filters, Strainers**—Industrial Catalog 1054, 48 pp, provides application and engineer-

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MOTOR
CLUTCH
BRAKE

STARTS, STOPS AT CONTROLLED RATES

AUTOMATIC CYCLING FOR:

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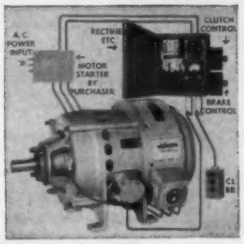
. . . many applications in automation



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Compactly built around rugged Fairbanks-Morse axial air-gap constant speed motor and nationally known time tested magnetic clutch and brake components. Can be operated up to 30 cycles per minute. Available in 1½ through 15 HP units, all with constant torque and at standard motor speeds between 600 and 1800 R.P.M. 15 HP unit is 18" in dia. by 25" long. May be ordered as standard units or complete with special control cabinet for automatic cycling. Write for details today.

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Illustration above shows a huge 84" duct fan . . . one of 24 built by Aerovent for installation in substations of The Consolidated Edison Company in New York City. These mighty fans, with 20 H.P. motors turning 580 RPM, move air against resistance at the rate of 100,000 CFM. Other Aerovent units are available from 12" to 96"; capacities to 145,000 CFM.

Aerovent Duct Fans . . . direct-driven for standard applications or belt-driven for conditions requiring motor outside airstream . . . may be ordered with special duty motors, alloy propellers and special protective coatings for extreme temperature, moisture or corrosive conditions.

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Direct-Driven Duct
For installations which permit connection of entire fan assembly in air-stream. For vertical or horizontal use. 12" to 96".

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Used for corrosive or high-temperature conditions, which require motor to be outside airstream. 2, 4, 6 or 7 blades. 12" to 96".

"Bi-Flo" Duct
For pressures in the 1½" to 4½" range. New 7-blade "Nacheta" Airfoil Propellers move more air with fewer horsepower. 18" to 48".

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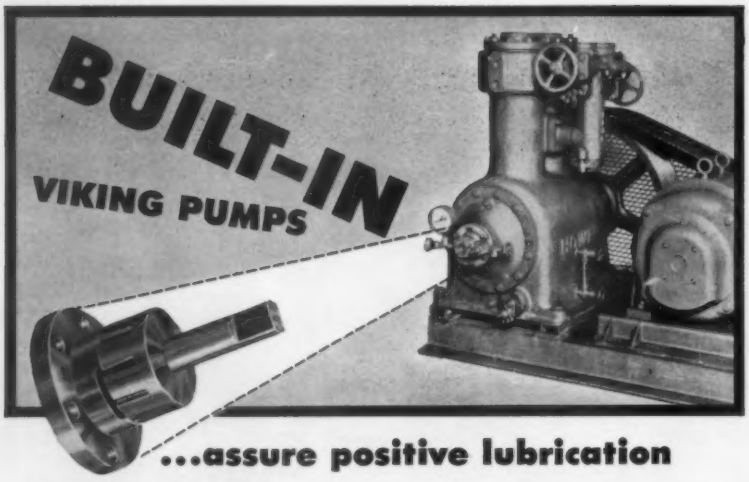

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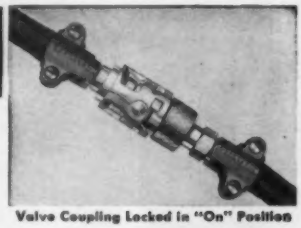

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give operator complete control of the air line at any point

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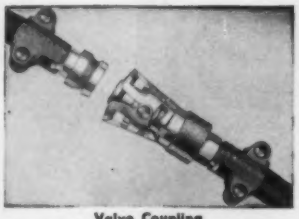

Valve Coupling Unlocked and Disconnected

Valve Coupling Locked in "Off and Exhaust" Position

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DATA FILE

(Begins on page 268)

ing information on company's line of microfilters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, specifications. Purolator Products, Inc.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

424 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

425 **Portable Electric Tools**—This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, benchdrill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. Photos included. The Black & Decker Mfg. Co.

426 **Pipe Tool Ordering Guide**—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

427 **Pipe Tools**—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, price data included. The Ridge Tool Co.

428 **Where to Use Your Stud Driver**—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

429 **Industrial Tools**—Hand tools and shop tools for production lines, maintenance work and service departments are featured in 108-pp Industrial Catalog 54-1. Loaded with pictures and tool facts, the book describes in detail the complete line of over 4,000 tools—including chests and cabs, wrenches and sockets, screwdrivers, pliers, pulling equipment, tool assortments and many others. Snap-On Tools Corp.

430 **Portable Tools** — Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metalworking industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection of tools. Accessories for all tools are also cataloged. Skil Corp.

431 **Electrode Guide**—Catalog 1318 is a 58-pp pocket guide to electrode selection. Mechanical properties and testing of electrodes, specifications, classification and properties of electrodes, are among the data featured, and different types of electrodes for a variety of applications are described. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

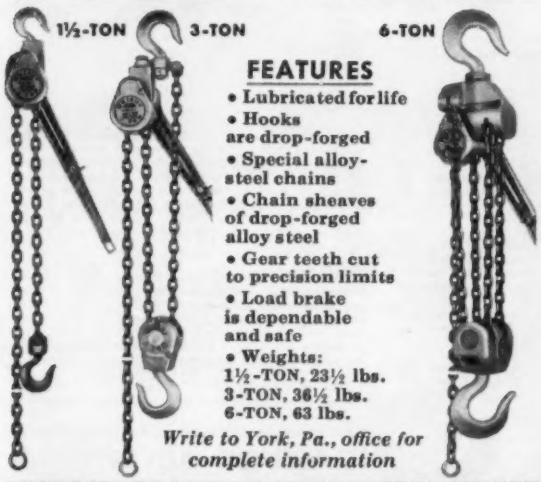
CONSTRUCTION

432 **Aluminum Building Products**—Form AD 285 is a 32-pp catalog covering company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and roughing-in details are provided on corrugated roofng and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. A discussion on sandwich wall system is presented. Accessories and fasteners are also covered. Aluminum Co. of America.

433 **Replacement Glazing**—Twelve-pp Booklet PL-251 gives detailed information on glaz-

NEW WRIGHT Type "C" Pull-A-Ways

THREE SIZES—1½, 3 and 6-Tons



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- Special alloy-steel chains
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- Load brake is dependable and safe
- Weights: 1½-TON, 23½ lbs. 3-TON, 36½ lbs. 6-TON, 63 lbs.

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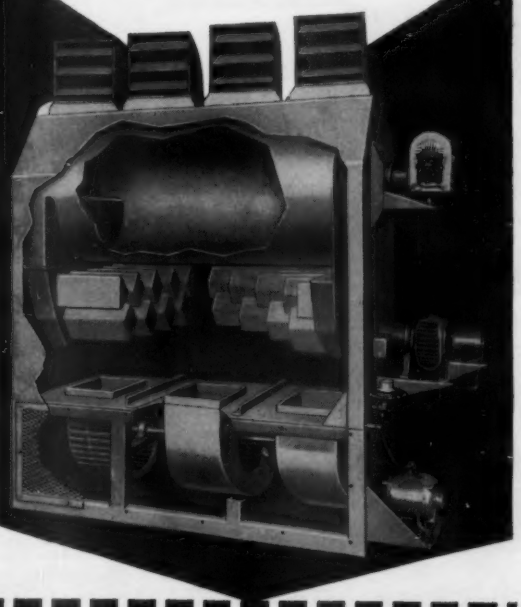

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266

DATA FILE

(Begins on page 268)

ing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

434 **Window Modernization**—How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

435 **Panel Wall Construction**—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q35-55. Includes installation photos, diagrams, specifications, as well as drawings, pointing out structural details. H. H. Robertson Co.

436 **Data on Panel Material**—How to improve factory methods with Masonite Presdwood is discussed in this 12-pp illustrated bulletin. Advantages are listed and types of presdwood used in maintenance and materials handling are indexed. Which type to use and where is covered, application detailed. Masonite Corp.

437 **Partitions and Walls**—Low cost sound-absorbing partitions and walls designed for movable and flexible office enclosures are featured in this illustrated bulletin. Dimensional diagrams and specifications are included, as well as photos of typical installations. GR Products Inc.

438 **Standardized Construction**—This 28-pp illustrated catalog on company's system of standardization in building construction presents a description of "F" buildings, a versatile series of flat-roof structures. Also features rigid-frame "A" series, offering clear spans of 100 ft and over; "B" series, center-column buildings where large clear spans are not required; "C" series, clear spans with crane runways. Luria Engineering Co.

439 **Steel Floor Plate**—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. Typical uses of the floor plate are pictured. United States Steel Corp.

440 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

441 **Steel Grating and Treads**—Bulletin 2486, 16 pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety; pictures applications. Blaw-Knox Co.

SPACE, PROCESS HEATING

442 **Plumbing, Heating Supplies**—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

443 **On Unit Heaters**—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls. Also provided are suggested layouts, piping diagrams. American Air Filter Co., Inc.

444 **Revolving Unit Heaters**—Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation tips. L. J. Wing Mfg. Co.

445 **Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

446 **Unit Heaters**—Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

447 **Electric Heating Units**—Catalog 50, 50 pp, contains complete engineering data on electrical heating units and equipment, including strip elements, finstrip elements, tabular elements, cartridge elements, ring elements, immersion heaters, circulation heaters, radiant heaters, forced air duct heaters, unit heaters, hot plates and others. Includes photos, dimensional drawings, prices, standard rating tables, and specifications. Edwin L. Wiegand Co.

448 **Industrial Ovens**—Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

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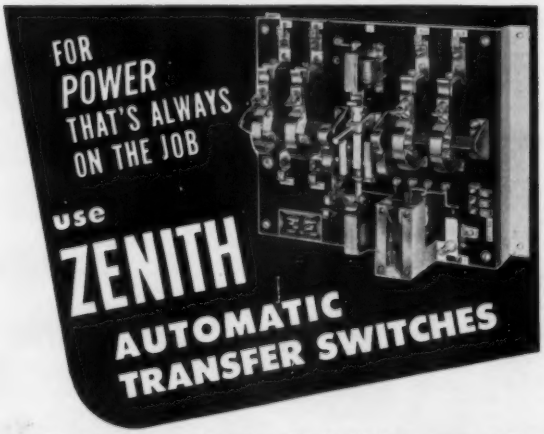

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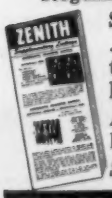

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DATA FILE

(Begins on page 268)

MAINTENANCE

449 Hot-Dip Galvanizing — How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits. American Hot-Dip Galvanizers Assn., Inc.

450 Basic-Roofing Information —"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

451 Protective Paint — Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection With Parlon." Photos show water and sewage works, paper mills, storage tanks, and chemical and food processing plants where these coatings have had long-term exposure to corrosive environments. Hercules Powder Co.

452 Paint Work Book—Bulletin 760, about 12 pp, is a practical manual giving painting data in charts, tables, diagrams and illustrations. Factors relating to use of company's protective coatings in mild to severe corrosive service are covered. Coatings and related primers are presented, along with surface preparation, priming application methods and maintenance instructions. Care and cleaning of brushes and spray equipment is explained. The U. S. Stoneware Co.

453 Painting with Aluminum —This helpful booklet describes advantages of aluminum paints, describes three basic types for non-absorbent surfaces, for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture, and practical suggestions for good results included. Use of aluminum paint on steel, galvanized metal, wood, masonry is detailed. Aluminum Company of America.

454 Insulation Coating — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe. J. W. Mortell Co.

455 Guide to Maintenance Products—Catalog 56, 48 pp, on industrial maintenance paint products lists specialized coatings to resist alkalies, acids, oils, grease, moisture. A complete buyers' guide, this book includes, besides maintenance coatings, waterproofings, roof coatings, caulking compounds, floor patching materials. Gives technical information on paints for wet walls in food processing plant; epoxy resin coatings offering high resistance to strong acids and chemical salts; a rust inhibitive paint for iron and steel surfaces and a fast-drying floor coating. Covers a full line of paints, enamels, varnishes, coatings. Steelcote Mfg. Co.

456 Guide to Coatings — This 1957 Coatings Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Illustrated in full color, this book contains information and recommendations to enable accurate determination of specific coatings needed for the job. Basic principle of Rust-Oleum's fish oil penetration into pores of metal is illustrated. Application photos give new ideas for protecting girders, tanks, boilers, roofs, other surfaces. Over 100 color chips show colors available in primers, short-oil and long-oil coatings. Galvinoleum, heat resistant, chemical resistant, and floor coatings are covered. Rust-Oleum Corp.

457 Coatings for Insulation — Manual 545, 20 pp, is a revised reference manual on adhesives, sealers, vapor barriers, surface coatings for use with insulation. Gives technical product data, application specifications. Includes handy reference chart covering 31 products, giving information on uses, application, and drying time. Benjamin Foster Co.

To receive catalogs circle item numbers on the Reader Service Cards provided on pages 263-264. You may also use the cards to order any literature mentioned in the ads.

458 Tough Floor Topping — Chemi-Top, a corrosion resistant floor topping for food processing, chemical and other plants having severe floor corrosion problems, is discussed in 8-pp Form A515R. What Chemi-Top is, and what it can do, are explained. Two basic formulations and three service types are covered, also a non-skid type for maximum slip resistance. The Garland Co.

459 Repairing Concrete Floors —A seven-step procedure for repairing concrete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with an actual photo and description of step involved. Strength comparisons between plain mortar and non-shrink premixed mortar are given. The Master Builders Co.

460 Light Scaffolds — This series of illustrated bulletins describes company's line of aluminum alloy Up-Right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

WATER TREATING

461 Feedwater Treatment—Process Bulletin B1, "Treatment of Boiler Feedwater by the Direct, or Indirect Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical, and complete, and points out how it improves steam quality, cuts maintenance. National Aluminate Corp.

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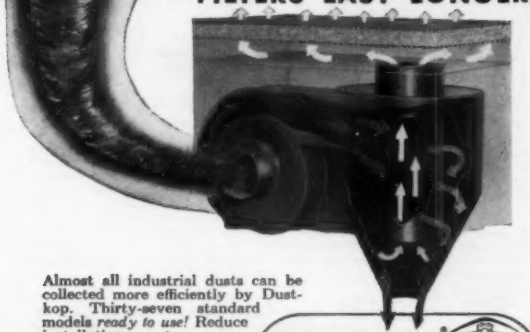

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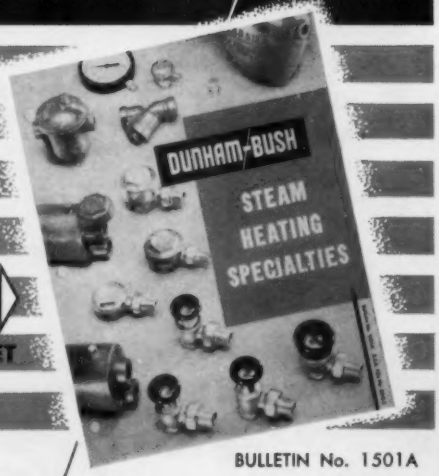

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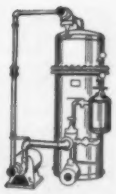

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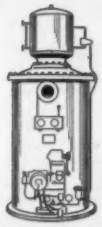

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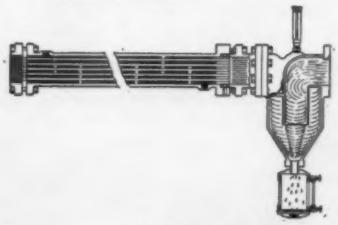

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DATA FILE

(Begins on page 268)

462 **Mixed-Bed De-Ionization** — Practical equipment for mixed-bed de-ionization at flow rates of 5 gal per hr to 5000 gpm is described in this 8-pp illustrated bulletin. Advantages of the mixed-bed de-ionizer are detailed, and installation and mechanical construction features discussed. Illinois Water Treatment Co.

BOILERS, GENERATORS

463 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information, is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 40,000 lb per hour. Space requirements are tabulated. Combustion Engineering, Inc.

464 **Shop Assembled Boiler**—Sixteen-pp Bulletin G-76 completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. The Babcock & Wilcox Co.

466 **Self-Contained Boilers**—Bulletin AD-144 reviews company's new CB boilers. Illustrations include installations, demonstrations. Engineering articles are featured covering such subjects as low noise level. Cleaver-Brooks Co.

467 **Package Boilers**—This 12-pp booklet on package steam generators describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

468 **Standard Generators** — Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in nine sizes with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster-Wheeler Corp.

OTHER EQUIPMENT

469 **Standard Storage Tanks** — The broad scope of services to which company's standard storage tanks are put is covered in this 20-pp catalog. Such qualities as versatility and economy are stressed, and typical installations are pictured. Engineering standards are also included. Graver Tank & Mfg. Co., Inc.

470 **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

471 **After Cooler**—Bulletin 130, 8 pp, explains functions of company's Aero after cooler in removing moisture from compressed air and gas. The apparatus is described and illustrated with diagrams and photos. Included also are diagrams and illustrations of applications in liquefication systems. Niagara Blower Co.

472 **Industrial Finishing Equipment**—Catalog A-657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking operations. Typical finishing systems handling a variety of products are pictured. The R. C. Mahon Co.

473 **Television Equipment** — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

474 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

475 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

476 **Abrasion, Corrosion Protection** — This 24-pp book illustrates how company's rubber faced steel plate reduces maintenance cost resulting from abrasion or corrosion. Shows case histories in a wide variety of industries. The Gates Rubber Co.

477 **Padlocks**—Catalog 56, 20 pp, features descriptions of padlocks to meet every need, with actual size illustrations of entire line. Special long shackle padlocks are included, as well as super security padlocks which have an extra short shackle clearance of only ½ in., and many others. Master Lock Co.

478 **Production Control System, Procedures**—Publication X-1268, 56 pp, details a method of material control intended to result in a shorter planning cycle while speeding production by eliminating cause of delay on the production lines. Illustrated with typical forms and charts, book outlines procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Remington Rand Inc.

479 **Water-Cooled Stoker**—Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker and explains operating features. Other drawings show typical installations. American Engineering Co.

480 **Industrial Leathers** — These illustrated data sheets cover company's leather products and include belting. Also give data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

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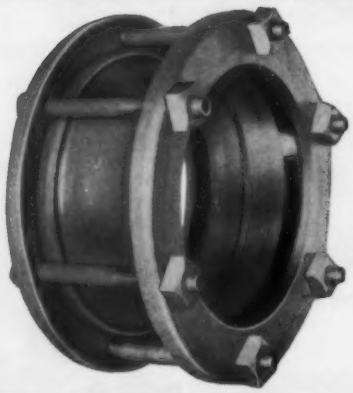

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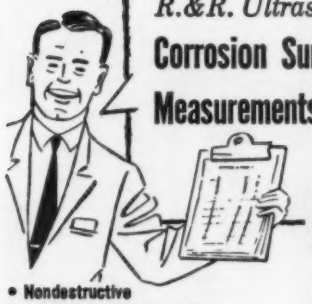

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WITH LOW COST, MOVABLE

SOUNDEX PARTITIONS

Both sides absorb sound in thick, acoustical spun glass. Easily set up, easily moved. Available in five heights. Write for free catalog or see us in Sweet's AF 22a Ga

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Plastic Coating Stops Costly Condensation Drip and Rust

THE COSTLY PROBLEM caused by dripping from this sweating pipe was permanently solved with one easy and inexpensive application of NoDrip Plastic Coating. Sweating pipes, ceilings, air ducts and other metal equipment are also completely protected against rust and corrosion by low cost NoDrip.

NoDrip Plastic Coating acts immediately to insulate and protect. One application adds many years of service life to metal equipment. NoDrip is also resistant to acid, alkali and brine...protects concrete, brick, plaster, tile wood or composition surfaces.

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JW Mortell COMPANY

FREE **32-PAGE NoDrip DATA HANDBOOK**

Complete with photographs, charts and technical information to solve your condensation problem. Write today.

Available at leading plumbing and mill supply houses

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Please send my FREE copy of the NoDrip Data Handbook.

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A practical low-cost sand blast used by plant engineers for maintenance work. Cleans rust, paint, scale from piping, valves, fittings, renovating buildings, stripping paint from trucks, busses, trailers, railroad cars, structural steel, storage tanks, ship hulls, etc. Can be fitted with Wet Adapting Nozzle for eliminating dust.

Write for Bulletin 36-C

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RUEMELIN MFG. CO.
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STRING GUARDS . . . Even though string and ravelings may wind around the hub, these string guards insure easy rolling at all times.

Built for Better Service

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DATA FILE

(Begins on page 268)

481 Solution Resins—This folder contains a series of bulletins on solution resins, covering six Exon vinyl chloride resins for solution coatings. Outstanding characteristics of each resin are described and a graph showing the solubilities of these resins in methyl ethyl ketone is included. Solution viscosity tables, data on formulating and other information included. Chemical Sales Div., Firestone Plastics Co.

482 Protective Clothing—Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves and suits and coats are featured, and protective features and advantages of this equipment are pointed out. The B. F. Goodrich Co.

483 Rescue Equipment—A complete line of hydraulically operated rescue equipment for use in releasing victims trapped in wrecked vehicles, under debris, and in burning buildings is described in 12-pp Catalog HR-300. Pictures show how victims are freed by Porto-Power. Blackhawk Mfg. Co.

484 Glassed Steel Reactors—Bulletin 927, 8 pp, describes glassed steel reactors for processing a wide variety of products under diverse conditions, stressing their versatility as to corrosion resistance, agitation, and temperature - pressure range. Standard specifications are tabulated and dimensional diagrams are included. The Pfaudler Co.

485 Improved Machine Mounts—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased machine mobility, reduce maintenance costs, lessen noise. Barry Controls, Inc.

486 Insect Control—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are discussed in detail. West Disinfecting Co.

487 Corrosion-Proof Materials—Bulletin CC-3, 16 pp, gives basic information on company's corrosion proof construction materials, covering chemical and physical data, estimating data and descriptions of products used for acid proof installations in the metal working, chemical, petroleum, pulp and paper and other industries. Included are sections on corrosion proof cements, tank linings, protective coatings, rigid plastic fabricating and rigid plastic pipe, plus a chart showing chemical resistance. The Atlas Mineral Products Co.

488 Corrosion Keys for Aluminum—This brochure is intended primarily as an aid to engineers designing aluminum into process plants or equipment, although it will interest those with other applications of the metal. It makes use of graphs which tell at a glance the yearly corrosion rate of more than 100 chemicals and other corrosive materials on aluminum. The Reynolds Metals Co.

27s Beacon Ray light

Why Tolerate Traffic Accidents in Your Plant?

Suspended loads **on cranes, monorails, conveyor belts and movable hoists have increased with mechanization.** ***Surface level traffic*** **of fork lifts and other shop trucks has increased.** ***Falling object, collision and pedestrian accidents*** **are rising in industry.**

The 27S Beacon Ray light can *supplement* **audible signals to pinpoint permanent danger spots in your plant.**

don't be silly...

Fire-Ball light

Shop trucks can supplement *their* **audible warnings with the new Fire-Ball 360° revolving light.**

Don't gamble a death, the misery of injury or lost-time accidents. A few dollars for modern *visual and audible* **signals can eliminate the causes.**

Write for Bulletin No. 353 and Catalog No. 100, *today.*

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LOW HEADROOM
HOISTS

Fraction-of-an-inch control of capacity loads from 3 to 25 tons.

New light-weight, low-headroom design solves many installation problems – in 3 to 7½ ton capacities; distance between track and eye of hook measures only 21 inches!

INCHING CONTROL – A combination of instantaneous motor torque and dual braking system provides inching control of capacity loads within thousandths-of-an-inch. Plain, hand-geared or motorized trolleys available.

DUAL BRAKING – Regenerative braking built into LeTourneau electric motors automatically regulates load travel . . . has no wearing parts, needs no adjustment. Powerful electro-mechanical brakes stop and hold capacity loads, prevent overtravel.

If you need to move big loads in closely defined limits, write for full information on LeTourneau "Big Lift" Hoists.

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INDUSTRIAL EQUIPMENT DIVISION
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F-119

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Got a packaging problem?

Let us help you solve it

You can make your tough packaging jobs easier—and often less costly—with Pfaudler products *and* engineering help.

HERE'S WHY:

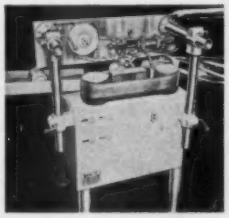
• Pfaudler offers you a complete line of rotary piston fillers, gravity fillers, and outsert applicators.*

You get the *fastest* filling possible with Pfaudler equipment—some models have actually been operated at as high as 1050 cans per minute! You get *cleaner* fill, too, because adjustable tilt controls prevent spillage. And some models of Pfaudler fillers can even fill small lots of *diversified* or widely varying containers.

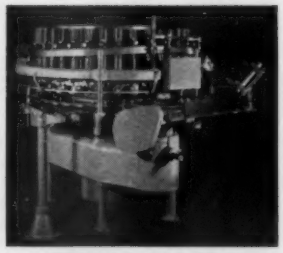
• At your request, qualified Pfaudler engineers will analyze your specific requirements. Then you'll know the right machine has been selected to do the job.

Learn more about how Pfaudler licks tough packaging problems. Contact your Pfaudler representative or write direct.

Ask for our free bulletins.



*The outsert applicator is a patented fast-action machine that attaches your message to the *outside* of your package—automatically! It's fully described in Bulletin 933.



RP-35 rotary piston filler—just one of several available piston fillers. Any one of them can package viscous or semi-solid products accurately and quickly. They're all described in Bulletin 911. For information on the many models of Pfaudler *gravity* fillers, request Bulletin 843.

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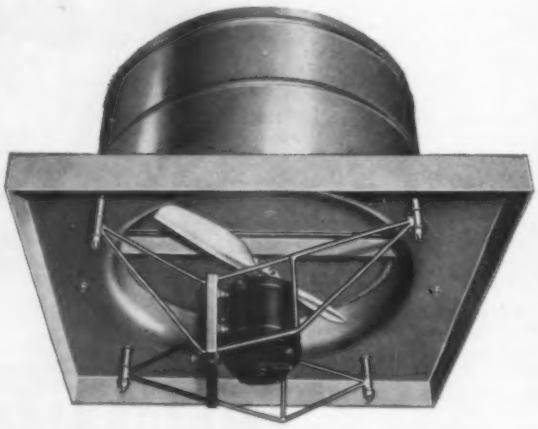
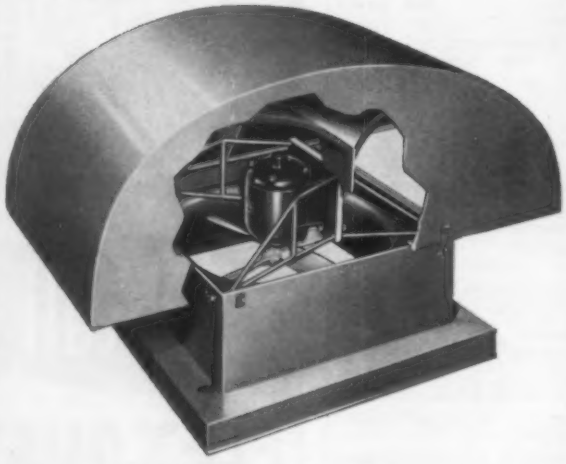
Design Simplicity OF HARTZELL *roof ventilators means...*



HARTZELL VERTIJET — Windband formed from 20 gauge galvanized steel, base from 14 gauge zinc-grip coated steel. Fan ring is integral part of base sheet. Two semicircular galvanized lids at base of windband open automatically when fan goes on, close weather-tight when it goes off. Throat sizes from 18" to 60"



HARTZELL REVERSIBLE ROOF VENTILATOR—One unit does the job of two conventional one-way ventilators. This unit moves air in either direction with equal efficiency; you convert from intake to exhaust at the flick of a switch. Throat sizes from 28" to 44".

Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

HIGH EFFICIENCY . . .

These Hartzell roof ventilators expel large volumes of heat, smoke and fumes quickly and efficiently because simplified design reduces obstructions to air flow. There's no maze of interior braces and supports. And all Hartzell roof ventilators are tested for performance in accordance with Standard Test Codes of the American Society of Heating and Air Conditioning Engineers.

LOW INITIAL COST . . .

Elimination of complications of design and construction produce savings in production costs which are passed along to you. Hartzell design simplicity means that Hartzell roof ventilators can offer top quality construction for long life and dependable service at a price much lower than that of more complex designs.

MINIMUM MAINTENANCE . . .

By minimizing the number of moving parts Hartzell reduces the number of things that can go wrong. Lids on vertical discharge models are mounted on corrosion resistant brass rods which turn on heavy Micarta plastic bearings which require no lubrication . . . won't stick, won't rust. Fan motors are ball-bearing type, conservatively rated for continuous performance. Under normal operating conditions, the only maintenance required will be periodic motor lubrication.

Write today, or ask your nearby Hartzell field engineer for a copy of the free Bulletin A-112A. It contains all the specifications for the two roof ventilators pictured, as well as for Hartzell's Airjet, Rotary and Penthouse roof ventilators.

HARTZELL
PROPELLER FAN CO.
Div. of Castle Hills Corp.
200 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES

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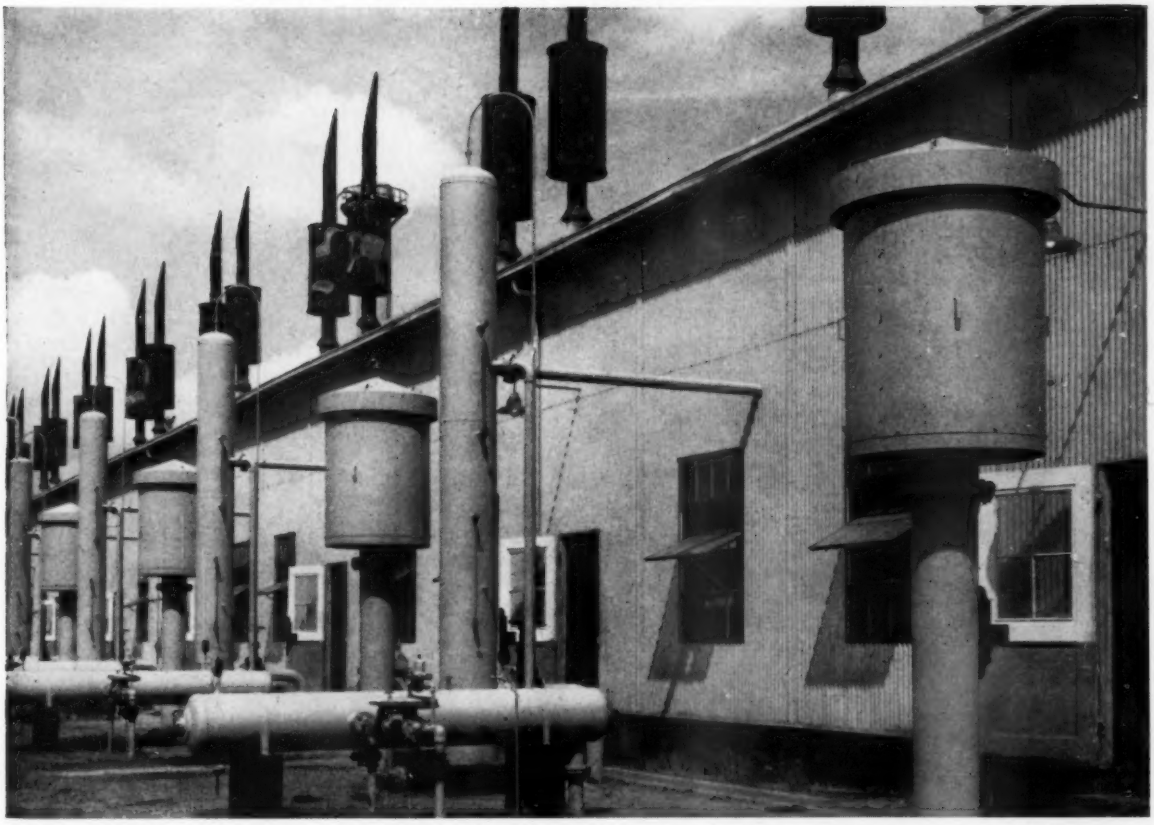

Partial view of a Falfurrias, Tex., gas plant showing four of eight Staynew air-intake filters that are effecting spectacular economies in maintenance costs for La Gloria Oil and Gas Co.

Filters Function Four Full Years Without Maintenance

In 1952 the Falfurrias, Tex., gas plant of La Gloria Oil and Gas Co. substituted two Staynew air-intake filters for conventional oil-bath filters on two gas-engine-driven, natural-gas compressors.

Two and a half years later the pressure drop through the Staynew filters had increased only to where it equalled the pressure drop of an oil-bath filter *immediately after an oil change*.

Air resistance was not yet enough to warrant cleaning. Therefore, La Gloria left the filters alone for another 19 months before deciding on an overhaul.

Oil-bath filters by comparison had required an oil change every 10 months, each change calling for *60 gallons of oil* and high labor costs.

As evidence of its satisfaction with Staynew filters, the company installed four more in 1954, another pair in 1955, and an additional three in 1956 to replace the last of the oil-bath filters.

The efficiency of Dollinger Staynew filters actually increases with use. So why buy filters that require rigid maintenance schedules? Let a Dollinger representative show you how to save time and money with Staynew Intake Filters, or write for Bulletin 100. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

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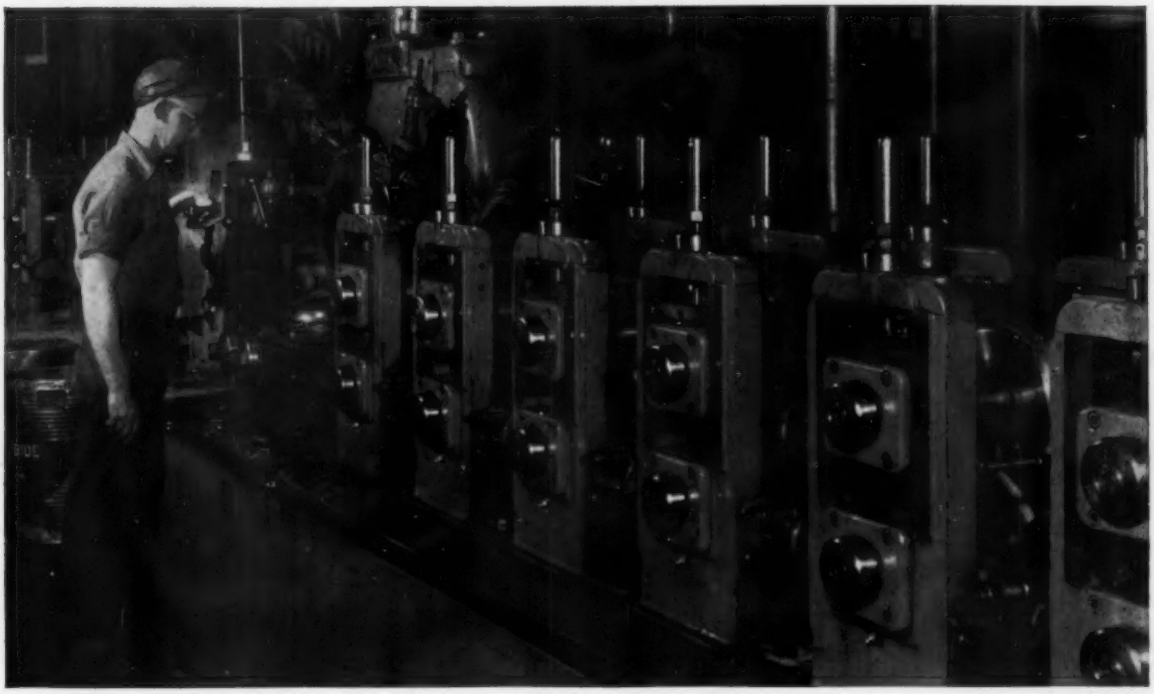
"We've simplified our lubrication and cut our bearing replacements sharply"

At Arvin Industries' Seymour, Indiana, plant all general grease lubrication is now handled with ***just one*** *lubricant—* ***Texaco Multifak.***



● **FORMING SEAMLESS TUBING** at Seymour, Indiana, plant of Arvin Industries—world's largest producer of automobile mufflers. Because of the outstanding job *Texaco Multifak* is doing here as a multi-purpose lubricant, two other Arvin plants are adopting its use.

Here's what's happened—

"Since we've gone to *Texaco Multifak*, there has been a great improvement in our maintenance efficiency. With just the one grease, we have less lubricant inventory and are always sure the right lube is being used. We've simplified our lubrication and, best of all, have cut our bearing replacements sharply."

Texaco Multifak is a premium-quality lubricant with excellent pumpability—ideal for central lubricating systems. It resists oxidation, is highly stable and provides effective lubrication over a wide temperature range and under the severest conditions.

Ask a Texaco Lubrication Engineer to help you bring these benefits to your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants, Fuels and Lubrication Engineering Service

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JUNE, 1957

Plant Engineering

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The magazine that helps plant engineers with their everyday problems

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